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HISTORY OF THE GREAT WAR

BASED ON OFFICIAL DOCUMENTS

MEDICAL SERVICES

GENERAL HISTORY

VOL. I

MEDICAL SERVICES IN THE UNITED KINGDOM; IN BRITISH GARRISONS OVERSEAS; AND DURING OPERATIONS AGAINST TSINGTAU, IN TOGOLAND, THE CAMEROONS, AND SOUTH-WEST AFRICA

BY

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ABBREVIATIONS IN VOLUME I

A.C.I.	Army Council Instruction.
A.D.G.	Assistant Director-General.
A.D.M.S.	Assistant Director of Medical Services.
A.G.	Adjutant-General.
A.M.S.	Army Medical Service.
A.M.S. (R.P.)	Army Medical Service (Retired Pay).
B.R.C.S.	British Red Cross Society.
C.C.S.	Casualty Clearing Station.
D.A.D.M S...	Deputy Assistant Director of Medical Services.
D.A.D.G., A.M.S.	Deputy Assistant Director-General, Army Medical Service.
D.D.G., A.M.S.	Deputy Director-General, Army Medical Service.
D.D.M.S.	Deputy Director of Medical Services.
D.G., A.M.S.	Director-General, Army Medical Service.
D.M.S.	Director of Medical Services.
G.H.Q.	General Headquarters.
G.O.C.	General Officer Commanding.
I.M.S.	Indian Medical Service.
L.C.C.	London County Council.
L.G.B.	Local Government Board.
L. of C.	Lines of Communication.
M.B.	Mounted Brigade.
M.B.F.A.	Mounted Brigade Field Ambulance.
M.O.	Medical Officer.
M.O.H.	Medical Officer of Health.
O.R.	Other Ranks.
P/W.	Prisoners of War.
Q.A.I.M.N.S.	Queen Alexandra's Imperial Military Nursing Service.
Q.M.A.A.C.	Queen Mary's Auxiliary Army Corps.
Q.M.G.	Quartermaster-General.
R.A.M.C.	Royal Army Medical Corps.
S.A.M.C.	South African Medical Corps.
S.A.M.N.S.	South African Military Nursing Service.
S.A.M.R.	South African Mounted Rifles.
S.M.O.	Senior Medical Officer.
S.R.	Special Reserve.
S.V.M.C.	Singapore Volunteer Medical Corps.
S.W.A.	South-West Africa.
T.F.	Territorial Force.
T.F.N.S.	Territorial Force Nursing Service.
V.A.D.	Voluntary Aid Detachment.
V.A.D. (G.S.)	Voluntary Aid Detachment (General Service).
W.A.A.C.	Women's Army Auxiliary Corps.
W.A.F.F.	West African Frontier Force.

PREFACE

IT has always been a matter of regret amongst students of the medical histories of wars that a consecutive history relating to the medical services has rarely been compiled, at any rate in connection with British campaigns. The facts and lessons taught by war have to be searched for in reports of Royal Commissions and of parliamentary, inter-departmental, and War Office committees; in the appendices to the annual reports of the Army Medical Department; in general publications and articles in journals; in Continental literature; as well as amongst other documents, many of which are untabulated and their existence not generally known. Popular books which deal mainly with details of interest to the general reader and are usually published before all the facts are available must necessarily be of limited historical value, and, although they throw many sidelights on events, frequently fail in accuracy and are consequently apt to be misleading. Thus the opportunities for studying the organization, development, and work of the medical services in the different phases of a campaign, and the details of the diseases, wounds, measures for the prevention of inefficiency, and other matters of medical and national interest are not readily available although they may have been recorded in official documents.

The main object, therefore, in preparing a consecutive medical history of the great war is to present in an accessible form the material buried in masses of war diaries, administrative files, official reports and other documents before they have been stored away and their existence forgotten except by a few. The feature which stands out most prominently in the history of the medical services is the magnificent and harmonious co-operation afforded by the medical profession throughout the Empire, and by a host of voluntary and other helpers in the work of the Army Medical Service and the Royal Army Medical Corps. A history of the medical work in the war becomes, therefore, a record not only of the medical services of the regular army but of all those who worked in it and with it. Probably no other branch of the army had such a widely distributed civil reserve from which to supplement its ranks in the national emergency; and it is significant that the general

desire in the medical world for a medical history of the war in accessible form was first brought to notice by Professor Adami, the Professor of Pathology and Bacteriology in the McGill University, Montreal, in a letter dated the 25th September, 1914, to Sir William Osler, the Regius Professor of Medicine at Oxford University. Professor Adami, who afterwards himself took part in the war in the rank of colonel in the Canadian Army Medical Corps, pointed out in his letter that in none of its wars had Great Britain thoroughly worked up its medical history. He suggested the formation of a committee with assistants in each base hospital to take charge of all case sheets, to secure fuller details of cases which promised to be of special importance, to preserve materials for a museum, and to make the necessary preparations for obtaining full records for a medical and surgical history of the war.

His letter was forwarded by Sir William Osler to the Director-General of the Army Medical Service, and on the 11th November, 1914, Surg.-General Sir Alfred Keogh, who had then been re-appointed to act as Director-General at the War Office, selected Lieut.-Colonel, then Captain, F. S. Brereton, an officer who had retired from the Royal Army Medical Corps and had subsequently devoted himself to literary work, to undertake the duty of preparing material for a medical history of the war. Lieut.-Colonel Brereton had accepted a temporary commission in the Royal Army Medical Corps when war broke out and was employed at the time as deputy assistant director of medical services in the Eastern Command. He was provided with an office and given authority to form a clerical establishment. The war diaries of medical units and administrative medical officers were sent to this office. With the arrival of a constantly increasing number of war diaries more accommodation became necessary and the office was moved to Brook House, Francis Street, Tottenham Court Road. As there were comparatively few documents in the first months of the war, Lieut.-Colonel Brereton's staff consisted of one lady clerk until May, 1915, when it was increased to two, and in September of the same year to five. There was no further increase until April, 1918, when two R.A.M.C. clerks and six lady clerks formed the staff.

But shortly after these arrangements for collecting material for a medical history of the war had been made, Sir Walter M. Fletcher, then Dr. W. M. Fletcher, the Secretary of the Medical Research Committee of the National Health Insurance, proposed that the services of his committee should be placed at the disposal of the Army Medical Service to assist

in the preparation of the medical statistics of the war. This valuable offer was promptly accepted and Sir W. Fletcher proceeded to organize a statistical department under the charge of Dr. J. Brownlee, the statistician of the Medical Research Committee. Premises were secured in Guilford Street, then in the British Museum, and finally in Endell Street. All the statistical records and medical case sheets both from military hospitals at home and from medical units and hospitals overseas were collected there for arrangement and scientific analysis under the general management of Mr. M. J. C. Meiklejohn. Dr. M. Young with a large staff of clerks was then appointed for abstracting, coding and tabulating the statistics of wounds and diseases. An unofficial attempt had already been made by Dr. W. N. Barron who was afterwards given a temporary commission as Lieut.-Colonel in the R.A.M.C., with the assistance of some voluntary workers to compile medical statistics in Paris, but it was obvious that these voluntary efforts could not attain efficiency, and Dr. Barron's work was abandoned when the Medical Research Committee undertook the work.

Sir Alfred Keogh also appointed a consultative committee to study the subjects of which a medical history of the war should consist. It met for the first time under his presidency on the 9th March, 1915, when the following sub-committees were formed :—

Statistics	Dr. J. Brownlee. Lieut-Colonel H. P. W. Barrow. Lieut.-Colonel W. N. Barron.
Medicine	Sir William Osler. Lieut.-Colonel O. L. Robinson.
Surgery	Lieut.-Colonel E. M. Pilcher. Professor F. F. Burghard
Sanitation ..	Colonel W. H. Horrocks. Lieut.-Colonel W. W. O. Beverridge.
Bacteriology and Pathology.	Colonel Sir W. Leishman. Captain F. W. Andrewes.

Sir Walter Fletcher and Lieut.-Colonel Brereton were appointed joint secretaries, the former for all matters connected with the technical, professional and scientific subjects, and the latter for the general history.

Although this committee did not meet at any subsequent period after its first and only meeting in March, 1915, both Sir W. Fletcher and Lieut.-Colonel Brereton continued to collect and organize material for a medical history. The

Medical Research Committee placed its organization for professional and scientific investigation at the disposal of the War Office and devoted much of its time and resources during the war to the collection of material for the medical, surgical, pathological,and statistical sections. It initiated investigations into several problems connected with the injuries and diseases of the war and published several monographs from time to time on these subjects. Pathological specimens of diseases and injuries were collected, and the museum staff of the Royal College of Surgeons undertook the task of arranging, preserving and classifying them. Professor Arthur Keith, the conservator of the Museum, Sir John Bland Sutton, and Professor C. E. Shattock specially interested themselves in this work, and a unique and valuable collection of specimens of war injuries and diseases, including casts, drawings and paintings from all theatres of war and home hospitals are now available for study in the Museum of the Royal College of Surgeons pending the provision of an Army Medical War Museum. Lieut.-Colonel T. R. Elliott was mainly responsible, as representative of the Medical Research Committee in France, not only for perfecting the system by which pathological specimens were collected in France and forwarded to the museum, but also for instituting an improved system of field medical cards and case cards which should include valuable statistical information regarding diseases and wounds. Two official artists were also employed in France under Lieut.-Colonel Elliott's instructions. Mr. S. A. Sewell worked under a contract with the Medical Research Committee at Boulogne from December, 1915, but subsequently Mr. A. K. Maxwell was enlisted in the R.A.M.C. and went to Boulogne in August, 1916, with a view to making coloured and other sketches of cases in hospital and of pathological specimens. The value to the nation at large of the scientific work thus initiated and carried out cannot well be over-estimated.

In connection with the general history, Lieut.-Colonel Brereton was authorized to visit the different battle fronts and collect sketches, plans and photographs for the formation of a museum which would contain illustrations and models of the character and work of the medical services from front to base, including sanitary appliances and other objects of historical interest. This valuable collection is now temporarily housed in the medical section of the Imperial War Museum, to the committee of which Lieut.-Colonel Brereton was appointed as representative of the Army Medical Service in November, 1917. The work connected with the collection and preparation of this museum developed rapidly and led in November, 1918,

to the sanction of a fixed war establishment for the office of the committee for the Medical History of the War and Army Medical War Museum, with Lieut.-Colonel Brereton as officer in charge. Nine R.A.M.C. non-commissioned officers and men who in civil life were artists and sculptors were obtained from the R.A.M.C. depot at Blackpool and taken on the strength of this establishment.

The foundations of a medical history were thus laid from an early period during the progress of the war, but until the end of 1918 no definite steps had been taken for the actual writing and preparation of the volumes. For this purpose a new committee was formed after a conference at Adastral House on the 12th December, 1918, under the presidency of the Director-General, Lieut.-General Sir John Goodwin. Major-General Sir W. G. Macpherson was then appointed Editor-in-Chief and given the task of organizing the writing of the history, assisted by a committee, which was in constitution similar to the original committee appointed by Sir Alfred Keogh in March, 1915. It consisted of the following, under the chairmanship of the Editor-in-Chief :—

Medicine	..	Sir William Osler. Major-General Sir Wilmot Herringham. Colonel T. R. Elliott.
Surgery	..	Major-General Sir Anthony Bowlby. Major-General Sir Cuthbert Wallace. Colonel Sir T. Crisp English.
Hygiene	..	Colonel Sir W. H. Horrocks. Colonel W. W. O. Beveridge.
Pathology	..	Major-General Sir William Leishman. Colonel S. L. Cummins.
Statistics	..	Dr. J. Brownlee. Major W. R. Galwey.

Sir Walter Fletcher and Lieut.-Colonel Brereton were also members of the committee for general scientific and historical subjects. Sir William Osler had only been able to attend one meeting of the committee before his lamented death in December, 1919. His place was taken in June, 1920, by Lieut.-Colonel Andrew Balfour.

During the spring and summer of 1919, pending Treasury sanction for the preparation and publication of volumes, the collection of documents and museum specimens was continued, and the committee formed into an editorial committee with the members as editors of the subjects which they represented. The selection of writers on the professional and scientific subjects was considered by them and estimates

of cost prepared and submitted to the Treasury. Treasury sanction was accorded in August, 1919. Suitable premises were obtained in Stanhope House, Kean Street, Drury Lane, and the war diaries and other documents collected and arranged there under the supervision of the Editor-in-Chief from October onwards, with the assistance of Major T. J. Mitchell, R.A.M.C., who was appointed to his staff in January, 1920.

The work of the Army Medical War Museum was then separated from that of the Medical History of the War and was carried out by Lieut.-Colonel Brereton, who was, however, retained on the committee of the latter until November, 1920, when he resigned on account of pressure of other work. Both Lieut.-Colonel Brereton and Major-General Sir W. G. Macpherson were appointed to the Historical sub-committee of the Committee of Imperial Defence. They were thus in touch with the general principles guiding the preparation of official histories of the war and obtained valuable assistance from Bdr.-General J. E. Edmonds, the director of the military branch of the historical section, and his staff.

More than 38,000 war diaries, in addition to numerous reports from commands at home and overseas as well as voluminous administrative medical files from the theatres of war, were registered and filed in the new office, and the various subjects and the documents containing references to them were indexed in order to facilitate the writing of the history from the available material.

As the time for the preparation of the history and its scope had to be limited to meet the Treasury conditions, the following volumes only are being prepared for publication. They cover the general functions of the medical services in war *:—

General History of the Medical Services	Four volumes.
The Diseases of the War and the Medical Aspects of Aviation and Gas Warfare	Two volumes.
The Surgery of the War	Two volumes.
The Hygiene of the War	Two volumes.
Pathology and Medical Research during the War	One volume.
The Medical Statistics and Epidemiology of the War	One volume.

* The general functions of the medical service, as definitely laid down in Field Service Regulations, are "the preservation of the health of the troops; the professional treatment and care of the sick and wounded; the replenishing of medical and surgical equipment; and the collection and evacuation of sick and wounded from the theatres of operations."

The volumes of the general history are a record, as far as possible in narrative form, of the chief features of the medical services in the United Kingdom, in garrisons overseas and with the expeditionary forces in the various theatres of war during the years 1914-1918 and during any subsequent period in which war incidents of historical interest or importance occurred.

The present volume, the first of the series, deals with the medical services in the United Kingdom and in garrisons overseas, with an account of the medical services in the operations against the German colonies in West and South-West Africa and in Tsingtau. The remaining volumes of the general history will deal with the medical services in France and Italy, in the Mediterranean theatres of war, and in Mesopotamia, Aden, East Africa, and Russia.

With regard to the subjects dealt with in the present volume the United Kingdom may be described as the centre from which men and material for the medical services were sent out to the various theatres of war, and to which a large proportion of the sick and wounded were returned for treatment and final disposal. In a minor degree the same may be said of the operations based on overseas garrisons.

Including labour units provision had to be made at one time or another for the medical services of forces with a total strength of nearly 3,500,000, operating in every variety of country and climate. A total maximum of 637,746 hospital beds were equipped and maintained in the United Kingdom and in theatres of war. Approximately 770 medical units of all descriptions were mobilized in the United Kingdom and despatched to expeditionary forces. In addition, 75 hospital ships or ambulance transports were equipped and administered by medical services in the United Kingdom, and 2,655,025 sick and wounded were brought to its shores for further treatment and disposal between August, 1914, and August, 1920. The personnel for medical services numbered at the time of the Armistice 144,514 officers and other ranks, most of whom joined the R.A.M.C. and were trained in the United Kingdom. Vast quantities of medical and surgical stores and equipment were procured, packed, and despatched. The medical services in the United Kingdom were thus a predominant and essential factor in the work of the war.

The material for the present volume has been obtained from War Office files, the reports of parliamentary and other committees, reports from the administrative medical services of commands, from consulting surgeons, physicians, and other specialists, from the different branches of the medical

department in the War Office, and from other sources. Valuable accounts containing elaborate and full details of the work in some of the commands in the United Kingdom have been received, but it has been impossible owing to limitation of space to reproduce them in full. Many of the large territorial force general hospitals and new military hospitals also submitted detailed historical accounts of their units, several printed in pamphlet form and illustrated. All these contain much of general but more especially of local interest, and although they might have found a place in the history of the medical services in the United Kingdom the details of each of the important hospitals alone would fill many pages. It has, therefore, been impossible to publish them in the present volume.

The information regarding the medical services of the Dominions is incomplete, as details have not been received from all of their medical services beyond what is contained in the war diaries of the medical units in the field. References to their work are, therefore, omitted from the present volume, but will be found in the volumes on the medical services with the expeditionary forces in France and other theatres of war.

The chapter on the reception and distribution of sick and wounded is compiled mainly from a report by Major-General Sir William Donovan, who was D.M.S. for Embarkation.

Much information regarding the medical examination of recruits has been obtained from the report of the committee of the House of Commons appointed to enquire into the working of the Military Service (Review of Exceptions) Act, 1917, from Army Council Instructions and from official documents published by the Ministry of National Service, whose Chief Commissioner of Medical Services, Sir James Galloway, has rendered material assistance.

The chapter on the supply of medical and surgical equipment and stores is compiled from very full reports by Major-General Sir G. B. Stanistreet and Colonel J. R. McMunn, who were in charge of this branch of the medical services at the War Office, the former until March, 1918, and the latter from that date onwards. The immense extent and variety of equipment and stores for which they were responsible are indicated in Appendix E of the present volume, although many additional tables, owing to lack of space, have necessarily been omitted.

The garrisons overseas in which Royal Army Medical Corps personnel were serving at the time war was declared, excluding India and Aden, which was under the Indian Government, were Bermuda and Jamaica in the West Indies; Sierra Leone in West Africa; Malta and Gibraltar in the

Mediterranean; Ceylon, the Straits Settlements, Hong Kong, and North China in the Far East; Mauritius, South Africa, and Egypt.

Egypt was the base for the operations in Gallipoli and Palestine and, consequently, the history of its medical service is included in the history of the medical services in these theatres of war. But Malta and Gibraltar, especially the former, acted in regard to the Mediterranean campaigns in much the same way as the United Kingdom did in connection with the operations in France.

South Africa was utilized in a similar capacity for the reception of sick and wounded from the East African theatre of war, Cape Town being also the base for the campaign against German South-West Africa. The expeditions against German West African colonies were based to a certain extent on Sierra Leone.

From all these garrisons accounts have been received of the expansion of their medical services to meet the conditions which arose from a state of war. The chapters concerning them are compiled from these reports.

The account of the medical services in Togoland is compiled from reports by medical officers who took part in the expedition; and that of the operations in the Cameroons from very full details and reports by Colonel J. C. B. Statham. Colonel P. G. Stock, who was director of medical services during the operations in German South-West Africa, compiled the narrative on which the chapters dealing with the history of the medical services during that campaign is based. But as the official account of the military operations was not available at the time there may be discrepancies in certain particulars between it and the narrative in Chapter XX. These are not, however, likely to be of vital importance for the purpose of the History of the Medical Services. The plates of six of the photographs have been kindly lent by Mr. Leo Weinthall, the Editor of *The African World*.

The story of medical services in the short campaign with the Japanese against Tsingtau is compiled from a report by Colonel J. A. Hartigan, who was senior medical officer with the British contingent, but certain details of the operations have been obtained from other accounts. In all cases the official despatches by the Commanders-in-Chief of the various expeditionary forces have been consulted.

Throughout the volumes the ranks and titles of officers mentioned in the narrative are those held by them at the time and not those which they may have subsequently obtained.

W. G. M.

CHAPTER I

THE PREPARATION OF THE ARMY MEDICAL SERVICE FOR WAR ORGANIZATION.

FOR a great number of years the Army Medical Service had little or no experience of wars in Europe or against highly trained and organized Continental armies, although it had constant experience of wars elsewhere and under different conditions. The South African War and the experiences of the Russo-Japanese War, however, made it necessary to review its organization and capacity for dealing with large numbers of battle casualties. Its preparation for war in Europe may be said to have commenced then. At the time of the South African War it was weak in numbers, was barely sufficient for peace requirements, and possessed no organization for expansion in war. The establishment of officers was designed to provide for the bearer companies and field hospitals of two army corps and a cavalry division and for seven stationary and three general hospitals on the lines of communication. This hospital accommodation provided beds for less than 3 per cent. of the troops. The establishment of other ranks of the Royal Army Medical Corps was designed for peace purposes only. A state of war was to be met by civilian assistance, increased employment of women nurses, and active recruiting. When the expeditionary force went to South Africa the establishments of the bearer companies and field hospitals of the 2nd Corps had to be used in order to complete the personnel of the stationary and general hospitals which accompanied the 1st Corps ; and, when provision had been made for the field army, the home hospitals were entirely denuded of personnel. The work in them was carried on by retired officers and civil surgeons.*

Had this been the state of their readiness for war in 1914, the medical services could scarcely have weathered the storm of public criticism which would have arisen after the first shock of battle, and after wounded, with their tales of hardship and suffering, possibly of neglect, had begun to flow into

* *See* the Official "History of the South African War," Vol. 1, p. 25, and the Report of the Royal Commission appointed in 1903 under the Chairmanship of Lord Elgin to enquire into the military preparations and other matters connected with the war in South Africa.

the hospitals in the United Kingdom, as would inevitably have been the case, in numbers beyond all previous anticipation and experience. When one scans the volumes of reports of Royal Commissions, of parliamentary and other enquiries, with their masses of printed evidence, to which breakdowns in the arrangements for the care of the sick and wounded in previous wars gave birth, a prominent contrast is afforded by the singular freedom of the Army Medical Service from adverse criticism during the years of the great war which was commenced in 1914.*

A review, therefore, of the changes which took place in organization, training, and administration during the period between the South African War and the outbreak of war in 1914 is necessary before the state of readiness of the medical services for a war of magnitude in Europe can be adequately appreciated.

After the South African War the arrangements for the care of the sick and wounded were examined and reported upon by Royal Commissions and inter-departmental and War Office committees; important lessons were subsequently learnt from the Russo-Japanese War of 1904-5; the Geneva Convention of 1906 afforded a basis for further organization of voluntary aid; a new and important position was given to the Army Nursing Service; and the old volunteer and militia forces were abolished and a territorial force created. The history of the medical services during the European War would be incomplete without a record of the special influence which each of these circumstances and events had upon the Army Medical Service and its state of efficiency when war was declared.†

As regards the administration of the Army Medical Service, the nomenclature of administrative medical officers of all grades was definitely settled both for peace and war, and fitted in with the general changes which took place in army organization. This was of much value, especially in connection with the field organization and training of the medical services, as the new administrative designations

* The campaigns in Mesopotamia and Gallipoli led to Commissions of enquiry. The preparations for the former campaign, however, were under the Indian Government and were only partially under the influence of the changes which took place in the Army Medical Service under War Office administration; and the defects in arrangements for the care of sick and wounded in the latter campaign were due to other causes than those which obtained at the time of the South African War.

† Successive directors-general of the Army Medical Service at the War Office during the period of preparation between the South African War and the year 1914 were: Sir W. Taylor, to 31st December, 1904; Sir Alfred Keogh, to 6th March, 1910; Sir Launcelotte Gubbins, to 31st May, 1914.

provided a clearly defined hierarchy in administrative appointments, irrespective of the substantive rank or seniority of the officer holding the appointment.

The term "principal medical officer" was abolished. It had given rise to considerable confusion during the South African War. The officer in charge of a general hospital, the administrative medical officer of a division, of the lines of communication, of a base, of an army corps or of a force in the field, all bore the same designation, and telegrams, letters, field messages and orders occasionally went astray or left a doubt as to the principal medical officer to whom they referred. A new nomenclature consequently appeared in War Establishments published in 1907. The principal medical officer of the field force became the director of medical services, and his assistant the assistant director of medical services; the principal medical officer of the lines of communication was designated the deputy director of medical services, and his assistant the deputy assistant director of medical services; the principal medical officer of a division was designated "administrative medical officer" of the division; the principal medical officer of a general or other hospital the officer commanding the hospital; and the principal medical officer of a base the senior medical officer of the base. The term principal medical officer consequently ceased to appear in connection with the field force, but it was retained for home and overseas commands until 1912, when the principal medical officers of all commands were designated deputy directors of medical services. At the same time the administrative medical officers of the divisions and districts were designated assistant directors of medical services.

In the organization of the medical services for administrative duties considerable changes also occurred. Until 1904 the administration of the War Office was in the hands of a Commander-in-Chief and Adjutant-General, with a War Office Council and Army Board. The Director-General of the Army Medical Department was a member of the War Office Council, the other members being the Secretary of State, the Under Secretaries of State, the Financial Secretary, the Adjutant-General, the Quartermaster-General, the Inspector-General of Fortifications, the Director-General of Ordnance, and the Director-General of Military Intelligence. In 1904, however, on the recommendation of Lord Esher's Committee, the post of Commander-in-Chief, the War Office Council, and the Army Board were abolished and the administration of the War Office put into the hands of an Army Council, but with

the Director-General of the Army Medical Service no longer a member of the new council. His directorate, which was previously an independent directorate, was placed under the Adjutant-General, who thus had charge of all questions connected with the medical services when these came for decision before the Army Council. The administration of the Army Medical Service consequently became bound up in the administrative work of the Adjutant-General's branch, not only in the War Office but also in subordinate commands, and the Director-General and his representatives thus lost to a great extent their previous independence.

This new position of the medical services gave rise to a considerable amount of criticism and forebodings at the time. It was regarded in many quarters as a retrograde step and likely to hamper that freedom of action which arrangements for sick and wounded demanded, by increasing the difficulties of administrative medical officers in obtaining direct information from other branches as to the course of events, the intentions of the general staff, and the military situation generally. The administrative medical officers were, it was felt, losing direct touch with the sources of information on these matters.

In 1904 an Inspector-General of the Forces was appointed on the recommendation of Lord Esher's Committee, and an Inspector of Medical Services was placed on his staff in March, 1907.* His duties were defined by the general principles laid down for inspectors in 1904. He was to confine his reports to the efficiency and training of the medical services for war; to ensure that the methods of training made for uniformity; to watch and form an opinion generally on all that affected the readiness of the medical services for war; and to take note of and encourage suggestions for improvement of training, equipment, and efficiency.

He was transferred from the staff of the Inspector-General to the department of the Adjutant-General at the War Office in 1909, and submitted reports of his inspections direct to him and not to the Director-General. During the seven years in which there was an Inspector of Medical Services previous to the war, the officer holding the appointment was able to visit all commands at home and abroad† and report on the medical arrangements for mobilization and local defence. One of the

* The post of Inspector of Medical Services was held by Colonel W. Babtie from 12th March, 1907, to 5th March, 1910; by Colonel M. O'Keeffe from 5th March, 1910, to 4th March, 1914, and by Colonel S. Hickson from the last date to the outbreak of war.

† He had no authority to inspect in India.

chief advantages of this system of inspection was the opportunity it gave for suggesting that what was good in one command should be adopted in other commands, thus raising as well as rendering more uniform the general standard of efficiency.

Lord Esher's Committee, in their report of 24th February, 1904, pointed out that there was at that time a great deal of information as regards technical military progress in other countries, and recommended that an officer of the Royal Army Medical Corps should be attached to the section of the directorate of military operations which dealt with intelligence. A medical section of the directorate of military operations was consequently formed at the end of 1905 after the Manchurian campaign.* Subsequently in 1908 an officer on the retired list of the Royal Army Medical Corps† was attached to the directorate of military training in connection with the Royal Army Medical Corps section of the Officers Training Corps. There were thus, for the first time in War Office administration, two officers of the medical service attached to the general staff, an innovation leading to important results in the organization and training of the medical services for war.

In 1901, owing largely to public criticism, two inter-departmental committees were appointed under the chairmanship of Mr. Brodrick, who was then Secretary of State for War, one to consider the reorganization of the Army Medical Service and the other to consider the reorganization of the Army and Indian nursing services. The reports of these committees resulted in further additions to the administrative control of the medical services at the War Office.

The committee on the reorganization of the medical services recommended, amongst other things, the formation of an advisory board, which was to have complete supervision of the Royal Army Medical Corps and control the Royal Army Medical Corps examinations. An advisory board for medical services was consequently constituted in 1902. It consisted of two officers of the R.A.M.C., the one an expert in sanitation and the other an expert in tropical diseases, a representative of the Quartermaster-General's department, an officer of the Indian Medical Service, and four civil medical men, with the Director-General and Deputy Director-General as members

* Report of Lord Esher's Committee, Part II, Sect. IV, para. 26. The appointment was held by Lieut.-Colonel W. G. Macpherson from 1906 to 1910 ; by Major C. E. Pollock from 1910 to 1914, and by Major J. V. Forrest from 1914 to outbreak of war.

† Lieut.-Colonel H. E. R. James.

*ex officio.** The extent to which this board should exercise administrative control was not clearly defined at the time, and the introduction of a civil element into the administration of the Army Medical Service created some misgivings, which were but re-echoes of the past, as may be gathered from the fact that a suggestion made by the Government in 1855 to vest the governing power of the Army Medical Department in a medical board with a civil element had been rejected by a select committee of the House of Commons in 1856 on account of the strong feeling against it amongst army medical officers, and also from the fact that the inefficiency of the medical services at the time of the Walcheren Expedition in 1805 was attributed to administration by a civil medical board.

These misgivings were eventually set at rest in 1907 by a reconstitution of the advisory board for medical services under the designation "Army Medical Advisory Board" with clearly defined functions. It was to have no administrative control nor could it take administrative action. It was to advise on medical, hospital and sanitary matters only, thus taking over duties previously carried out by the Army Sanitary Committee which came into existence after the Crimean War, and by the Army Hospital Committee which was formed in 1903 to advise on the provision and equipment of military hospitals. These two committees had been amalgamated in 1906 in an "Army Hospitals and Sanitary Committee," and it was this committee which was absorbed into the Army Medical Advisory Board in 1907.

The committee on the reorganization of the Army and Indian Nursing Service resulted in the disappearance of the old army nursing service and its reconstitution in March 1902† as the "Queen Alexandra's Imperial Military Nursing Service." A nursing board was then formed at the War

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* The constitution of this board appeared for the first time in the *Army List* for May, 1902. The members then were :—

Surgeon-General Sir Wm. Taylor, D.G., A.M.S.
Surgeon-General A. Keogh, D.D.G., A.M.S.
Lieut.-Colonel D. Bruce (expert in tropical diseases).
Major W. G. Macpherson (expert in sanitation).
Surgeon-General Hooper, representing the Indian Medical Service.
Colonel W. A. Dunne, A.Q.M.G., representing the War Office.
Sir F. Treves.
Dr. C. Ball.
Dr. E. C. Perry.
A. D. Fripp, Esq.
Dr. J. Galloway.

The Matron-in-Chief was also a member of the board when Nursing Service questions arose.

† Army Order 67 of 1902

Office with a civil element on it, analogous to the advisory board for medical services, and a Matron-in-Chief was appointed for the first time to the staff of the Director-General of the Medical Service.*

In the period therefore between the South African War and the outbreak of war in 1914 the following important changes had been effected in the administration of the medical services.

The nomenclature of administrative appointments for commands at home, abroad, and in the field was converted into a clearly defined administrative hierarchy, consisting of a D.M.S., D.Ds.M.S., A.Ds.M.S., and D.A.Ds.M.S.

The administration of the Director-General's branch at the War Office was placed under the Adjutant-General, who represented the medical services on the Army Council.

An Inspector of Medical Services was appointed to the staff of the Inspector-General of the Forces and subsequently to the Adjutant-General's Department.

A medical section was formed in the directorates of military operations and of military training in the General Staff branch of the War Office.

An Army Medical Advisory Board with a civilian element was constituted to advise on technical medical and sanitary matters.

The administration of the army nursing service was placed in the hands of a Matron-in-Chief, as head of a nursing section at the War Office, under the Director-General, and a nursing board was constituted.

At the time of the South African War the field medical organization differed in many important details from the organization which was subsequently established. The medical units, for which there were, on paper, fixed establishments, consisted at that time of bearer companies, field hospitals, stationary and general hospitals, advanced and base depôts of medical stores, hospital trains and hospital ships. Convalescent depôts were not provided for nor were there special sanitary units, but an organization for the reception and distribution of sick and wounded on arrival in the United Kingdom was formed in connection with the war, and the organization of voluntary aid had been taken in hand.

Each brigade in the field had, as part of its composition, one bearer company and one field hospital, and each division one field hospital, the field hospital being organized for 100 sick and wounded. These units were independent of one

* The post of Matron-in-Chief was held by Miss Sidney Browne from April, 1902, to April, 1906, Miss C. H. Keer from April, 1906, to April, 1910, and Miss E. H. Becher from April, 1910, to August, 1919.

another. Not only was there an absence of adequate co-operation in the brigade between the officer commanding the bearer company and the officer commanding the field hospital, but also friction occasionally arose from the fact that at one time the bearer company commander, and at another the field hospital commander, might be the senior medical officer of the brigade. This led to administrative confusion. It was in the power of the administrative medical officer of the division to insist upon adequate co-operation of the medical units of the brigades, but his power of control did not appear to have been exercised sufficiently, and the situation, as it then existed, cried out for reform. During the final phases of the South African War, when the British force was split up into small columns and waging a guerrilla warfare, it was found necessary to reconstitute this organization of field medical units, and small medical units were formed to accompany the columns by amalgamating sections of bearer companies and field hospitals in one unit.

In 1901 a War Office committee, of which Colonel Heath was president, considered these points, and recommended that the functions of the bearer company and field hospitals should be combined in one unit, but it was not until the year 1905 that effect was given to this recommendation. The new unit was the field ambulance, and it ceased to be a brigade unit. Two field ambulances were allotted as divisional troops to each division, and one field ambulance as corps troops to an army corps, thus replacing the two bearer companies and three field hospitals which were the medical units within the division previously. At the same time a field ambulance was specially organized for a cavalry or mounted brigade, combining also the functions of the former bearer company and field hospital.

The organization of these new units was in some respects complicated. They were divided into bearer divisions and tent divisions, the former of which consisted of stretcher bearers only, without equipment for ambulance transport, and without an advanced dressing station or collecting post party. The tent division gathered in all the remaining elements of the unit, including its ambulance transport. A field ambulance was further divisible into three sections, each section consisting of one-third of the bearer division and one-third of the tent division, designated respectively bearer subdivision and tent subdivision, but in the case of the cavalry and mounted brigade field ambulance the unit was divided into two sections only.

The ambulance transport of field ambulances and cavalry

field ambulances consisted of ten ambulance wagons. In the former units all of the wagons were of one type for four lying-down cases or twelve sitting; in the latter four were light ambulance wagons for two lying or six sitting, and six were heavy ambulance wagons for four lying or twelve sitting.

The field and cavalry field ambulances were equipped to accommodate 50 sick and wounded in each section, or a total of 150 patients in the former and 100 in the latter.

Apart from the regimental medical service, consisting of one medical officer with each battalion, cavalry regiment, brigade of artillery and smaller units or groups of smaller units, these ambulances represented the whole medical organization in front of the lines of communication for an army in the field as reconstructed in 1905. In the mobilization instructions and field army tables issued in that year provision was made for a cavalry field ambulance to each of three cavalry brigades, two field ambulances to each of three divisions, and a field ambulance to troops of one corps. Two field ambulances were also authorized for a 4th and 5th Division, and fourteen stationary and ten general hospitals, two advanced and two base depôts of medical stores, two ambulance trains, and two hospital ships were allotted to the lines of communication.

The Russo-Japanese War had now ended, and its lessons were being examined by the recently constituted General Staff at the War Office, and, as regards the organization of medical services for a war of similar magnitude, by the medical section in the directorate of military operations. As compared with the field medical organization of the Russian and Japanese armies, and in fact of Continental armies generally, the organization evolved from the lessons of the South African War was considered inadequate for the rapid collection and evacuation of the large numbers of wounded which it was anticipated would be thrown on the field ambulances at any moment in a European war. With four divisions only engaged in battle the number of wounded might readily be 20,000 in one day.*

In a war of movement it was anticipated that the field

* In none of the battles of the South African War did the number of wounded exceed 1,000, with the exception of Spion Kop, when the number was 65 officers and 969 other ranks wounded between the 17th and 24th January, 1900; during the march of Lord Roberts' force from the Modder River to Bloemfontein, 11th February to 13th March, 1900, when the number, including the wounded at Paardeberg, was 119 officers and 1,663 other ranks; and in the operations for the relief of Ladysmith, when the number of wounded between 14th and 27th February, 1900, was 100 officers and 1,762 other ranks. The total number of wounded during the whole war from 9th October, 1899, to 31st May, 1902, was 1,758 officers and 19,399 other ranks.

ambulances would consequently become rapidly congested and rendered immobile unless they were in close touch with other units to which the wounded could be transferred previous to their evacuation to the hospitals on the lines of communication. Representations on this point were made by the general staff and resulted in a new unit, called the clearing hospital, being introduced into war establishments as a link between the divisions in the field and the lines of communication. Zones of work, following the Continental system, for collection, evacuation and distribution of sick and wounded to permanent hospitals were defined. The field ambulances and regimental medical service were recognized as the medical units for collecting wounded, the clearing hospitals and ambulance trains the units for receiving wounded from the collecting zone and evacuating them to the base; stationary and general hospitals and the hospitals in the United Kingdom the units to which they would be distributed from this evacuating zone for permanent treatment. It was urged that the new clearing hospital unit should have its own transport to enable it to follow up the field ambulances as they advanced and maintain a constant link between them and the line of railway. It was also urged that there should be an ambulance convoy associated with it for bringing wounded from the field ambulance to the clearing hospital, and from the clearing hospital to the ambulance train. These proposals, however, were rejected by the Army Council at the time, as they involved an increase of transport already assuming unwieldy proportions in the field.* The method by which clearing hospitals were created was also not altogether satisfactory. A number of the stationary hospitals, already allotted to the lines of communication, were designated clearing hospitals, without alteration in their organization. The stationary hospitals, which had formerly been equipped for 100 beds, had been organized in 1905 as units for 200 beds. The clearing hospital thus became a unit for 200 beds, but was given a modified equipment with field stretchers instead of beds and without nursing sisters.

From a General Staff point of view misgivings existed regarding the efficiency of this compromise, and the opportunity was taken by the medical section of the directorate of military operations, in reviewing, in April, 1907, the reports of the military observers of the United States Army attached to the armies in Manchuria during the

* A War Office committee under Major-General Stopford was considering at the time a reduction in transport and field equipment.

Russo-Japanese War, to submit a long memorandum, which raised the general question as to whether the medical service was, in a military sense, fit for war. It was pointed out in this memorandum that the chief defects consisted in insufficient organization for evacuation of sick and wounded from the field ambulances, insufficient organization of voluntary aid as supplementary to the Army Medical Service, and inadequate provision for training of Royal Army Medical Corps officers in their administrative duties in the field. The number of clearing hospitals which had been sanctioned was six, or in the proportion of one for each division in the field, but no arrangements were made for rendering them mobile, except by transport which might or might not be available on requisition, and there was no ambulance or other transport definitely allotted to the medical services to work between the field ambulances and the clearing hospitals. It was pointed out that the clearing hospital as organized accommodated only 200 sick and wounded, whereas it should be large enough to take over the sick and wounded from all field ambulances of a division. It was also urged that it should be made mobile enough to be pushed forward rapidly, and that there should be a special organization of ambulance transport from field ambulances to railhead. The experience of previous campaigns was against obtaining transport for this purpose by requisition on other branches of the service.

A War Office committee was appointed to consider this memorandum, under the chairmanship of the Director-General of the Army Medical Service, with representatives of the General Staff and Quartermaster-General, the officer in charge of medical mobilization, and the officer in charge of the medical section of the directorate of military operations as members. They reported that they were unanimously of opinion that, under conditions of severe fighting or of fighting prolonged over several days and considerable distances, the existing organization was inadequate to ensure rapid evacuation of the sick and wounded from the field armies, and recommended that, in order to effect greater efficiency in this direction, the clearing hospital should be made a mobile unit, with a definite scale of personnel and material for its transport, and that a transport section should be formed for the purpose of evacuating sick and wounded from field ambulances to clearing hospitals and from clearing hospitals to railhead. It was suggested that the section should be designated the " sick and wounded convoy section " and have a cadre establishment of one officer and two non-commissioned officers of the R.A.M.C., with such transport

personnel as might afterwards be determined. It was further suggested that the nucleus of this convoy might be formed by the transport vehicles of the clearing hospital after they had been unloaded and that a specially selected warrant officer of the Army Service Corps should be placed in charge of them for the purpose. The amount of transport which it was estimated would be required to render a clearing hospital mobile was 20 wagons, including transport of supplies for personnel and animals. The military members of the Army Council considered, however, that it was not necessary to make any provision for transport to be exclusively assigned to the medical services for the purpose indicated, although the requirements should be recognized and met, if possible, by utilizing local resources as well as the wagons bringing up supplies to the troops, of which there would be a large number returning empty and available for evacuation of sick and wounded from the field ambulances. In view of the subsequent development of clearing hospitals and ambulance convoys during the European war, this history of the origin of the casualty clearing station and its anticipated requirements is of special interest.

In November, 1908, the provision of motor ambulances was considered by the advisory board for inclusion in the estimates of 1909–10, but the provision recommended was a meagre one. It referred to peace requirements only and did not mark any advance in organization for motor transport of sick and wounded in war.

But if the changes in field medical organization, as thus finally adopted in 1907, did not altogether allay the misgivings regarding the provision for collecting and evacuating wounded in the event of a great war, the lessons of previous campaigns had specially emphasized the necessity of an organization for the prevention of disease. At the time of the South African War there was no independent sanitary organization in the army. The medical officers with fighting units and administrative medical officers were responsible advisors of unit and formation commanders regarding the measures for preventing disease. Medical officers generally were charged with the duty of sanitary inspections, but there was no trained sanitary personnel under their control, or indeed anywhere. The need for better organization for preventing disease was brought to notice by a Royal Commission appointed in 1901, under the chairmanship of Lord Romer, to enquire into the arrangements for the care of the sick and wounded in the South African War. The recommendations of this Commission on the subject of

sanitation did not, however, go very far. They merely recommended the appointment of properly qualified officers of the R.A.M.C. to undertake sanitary duties.

Mr. Brodrick's committee, which followed, gave no detailed scheme for the organization of sanitary services and confined itself to the general recommendation that there should be specialist appointments in the R.A.M.C. But one of the members of the committee, Dr. Ogston, in a supplementary note took exception to the report of the Committee as a whole, because, amongst other points, it did not provide for the formation of a sanitary corps of officers for carrying out proper sanitary measures in peace and war.

In 1904, Lord Esher's committee, in recommending that an officer of the R.A.M.C. should be attached to the directorate of military operations, specially defined his duty as that of supplying information on new developments in military hygiene, but made no further reference to sanitary organization beyond the general statement that sanitation in war and peace was closely bound up with discipline and that this constituted a reason why the proper position of the Director-General of the Army Medical Service should be under the Adjutant-General.

The advisory board for medical services, appointed in 1901 on the recommendation of Mr. Brodrick's committee, dealt with the subject of sanitation in much the same way in its earlier meetings. The old Army Board, of which the Director-General, Army Medical Service, was a member, had already, in February, 1901, recommended that medical officers specially charged with sanitary duties should be included in war establishments of the staffs of both army corps and divisions in the field, and that every effort should be made to impress the importance of the subject of sanitation upon officers and men of the army. The newly appointed advisory board for medical services endorsed this recommendation at its sixth meeting in February, 1902, but rejected Dr. Ogston's proposal to form a special sanitary corps.

A scheme for the appointment of specialist sanitary officers to nineteen commands or districts at home and abroad, including five already allotted to the R.A.M.C. in India, was subsequently submitted to the Army Council by the advisory board in January, 1902. But it was not till 1905 that any definite progress was made in the general organization for prevention of disease. In that year a syllabus of three lectures on sanitation in the field was drawn up and approved by the Army Council for delivery each term at the Royal Military Academy, Woolwich, and the Royal Military

College, Sandhurst. These lectures were elementary, but more advanced lectures were the same year arranged to be given at the Staff College.* The advisory board for medical services at the time resisted any attempt to reduce the amount of teaching of this all-important subject.

In the following year, 1906, the advisory board considered that the time had now arrived to undertake a systematic survey of the whole subject of the prevention of disease in war and the organization and sanitary measures required for this purpose. A committee was consequently formed to investigate the influence of clothing, external temperature, food, and exertion on bodily condition and on the physical training of recruits. This committee continued to investigate and report on these subjects during the following years and did not complete its labours until 1909.

At the same time the Director-General and his staff had been working out schemes and equipment for providing a pure or purified water supply to troops in the field and for sanitary measures generally.

The organization required for supplying pure water to troops in the field at all times had been specially dealt with by the advisory board in a report on the subject submitted to the Secretary of State for War in February, 1902. The public mind had become obsessed at that time with the idea that the extensive and fatal prevalence of enteric fever during the South African War was due to polluted water supplies and to no other causes. Irresponsible writers flooded the public press with articles on the subject. A scientific committee appointed by the War Office to consider the incidence of dysentery at the time of the South African War was not exempt from the error of ignoring other causes and devoted most of its report to the provision of a pure or purified water supply in the field.

At the time of the Russo-Japanese War the subject was still further emphasized in press communications and in articles by writers with no special knowledge. It was assumed, although on no logical basis, that the Japanese in that campaign were remarkably free from disease ; the only argument brought forward being that the proportion of deaths from disease was less than that of deaths from wounds. The Japanese, in fact, were not more free from preventable disease in the Russo-Japanese War than the British in South Africa ;† but both British and American writers assumed that

* Major R. H. Firth was appointed lecturer.

† *See* Medical and Sanitary reports by officers attached to Russian and Japanese armies during the Russo-Japanese War, Report No. 16.

diseases must have been few because the battle casualties, which were exceptionally heavy, exceeded the number of sick. Extravagant and imaginative descriptions were published of the way in which the Japanese medical officers went on in front of the troops in the field with a view to examining the water supplies microscopically before they could be declared safe for the advancing troops, which was not in fact the case.

The organization for providing a pure water supply at all times consequently assumed large proportions in the preparation of the British Army for war in the future. Special water carts with sterilizing apparatus were designed and a non-commissioned officer and men of the Royal Army Medical Corps, the latter in the proportion of two to each cart, were added to the war establishments of each unit in the field for their care and management. This was an entirely new and important advance in organization for field sanitation.

But the scheme of sanitation in the field fortunately did not stop short of ensuring the purification of water supplies. Each unit in the field was to form from its combatant personnel a sanitary detachment of one non-commissioned officer and eight men for regiments and battalions, and four men for smaller units, whose duty was to attend to all matters of sanitation within the unit, its camps and billets when in the field, and to act as the sanitary police of the unit. With troops operating against an enemy it was desirable that sanitation should be the concern of each unit and of each individual in it, and the officer commanding the unit was made responsible for this.*

On the lines of communication the conditions were different. The various camps and billets were more or less permanent establishments but the population in occupation of them was constantly changing. Troops would arrive and move on again at any hour of the day or night. It was not possible, therefore, to place the responsibility of maintaining sanitation in the permanent camps on the officers commanding these migratory units. Still less could they be made responsible for the maintenance of permanent water supplies and sanitary constructions.

To meet the conditions, therefore, on the lines of communication sanitary sections and sanitary squads were introduced into war establishments as special technical units of the R.A.M.C. They were to be responsible for all sanitary executive work in connection with the camps at ports of

* An Army school of sanitation was established at Aldershot for instruction of the sanitary detachments, and an official manual of sanitation was published as the text-book for officers and other ranks.

embarkation and disembarkation, at railheads, in the various rest camps, and at entraining and detraining stations along the lines of communication.

Finally, provision was made for the appointment of a sanitary commission consisting of a general officer, an officer of the Royal Engineers and an officer of the R.A.M.C., whose duties were to deal with the larger problems of sanitation in an area of operations, co-ordinating civil and military sanitation within it and advising generally on important sanitary work.

The question of making anti-typhoid inoculation compulsory was considered by the advisory board in February, 1912. The board considered that despite the most careful sanitary organization there must continue to be grave danger of typhoid fever becoming epidemic during operations in the field, and expressed the opinion that, in view of the increased resistance to infection conferred by anti-typhoid inoculation and the impossibility of inoculating the expeditionary force after mobilization was ordered, the only method of securing the maximum of immunity would be by the adoption of anti-typhoid inoculation as a routine matter in times of peace. The board, therefore, strongly recommended to the Army Council that these anti-typhoid inoculations should be made compulsory for all soldiers on attaining the age and service at which they become available for active and foreign service; they drew attention to the procedure then adopted in the Army of the United States of America and the results obtained during its recent mobilization on the Mexican frontier. The Army Council, however, did not consider it advisable that anti-typhoid inoculation should be made compulsory, but directed that the soldier should be encouraged by lectures and by leaflets to take advantage of the safety conferred by it.

In March, 1908, the attention of the advisory board was drawn to the small number of appointments for officers qualifying as specialists in bacteriology. At that time there were only four of these appointments at home and two abroad, although thirty-one officers had qualified as specialists. Of these only eight were employed as clinical pathologists or on special research work, and, of the remainder, fourteen were employed on ordinary duty and nine in sanitary work. Specialist pay was only granted to the clinical pathologist at certain large hospitals. The advisory board consequently recommended the appointment of a clinical pathologist to all hospitals containing 100 beds or over, but no special steps were taken at the time to increase the number of appointments for bacteriological work in the army.

The next important advance in the organization of the

medical services for a war in Europe was the organization for the disposal of convalescents. The want of a definite organization and procedure regarding the despatch and disposal of invalids and their documents from the base of operations gave rise to much confusion during the South African War. The question of the principles which should guide the military authorities in sending invalids to the United Kingdom in any future war of magnitude was raised in 1904; and in June, 1905, a committee was formed at the War Office to consider and report on the general rules which should be followed. The committee submitted its report in July of that year. For the purpose of disposal and distribution four classes of invalids were recognized:—

(1) Those requiring hospital treatment on disembarkation.
(2) Those not in need of hospital treatment but requiring medical care and observation.
(3) Those sufficiently recovered to proceed on sick furlough.
(4) Those reported fit for duty at the end of the voyage.

For the first class, hospital accommodation had to be provided. Under the conditions then existing it was estimated that 5,000 beds were likely to be available in the military hospitals in the United Kingdom, and this represented the maximum number of invalids from the South African War who were in hospitals in the United Kingdom at any one time out of a force of 220,000. But a scheme of hospital centralization, which was then being submitted by the advisory board for medical services, would result in reducing the probable number of available beds for sick and wounded from overseas to 800. The total number of beds in military hospitals at the time was 9,600, and the centralization scheme proposed their reduction to 5,300, of which 4,500 were constantly occupied by the sick of the home army.

The expansion of hospital accommodation in time of war was consequently a matter for serious consideration, but the War Office committee made the very optimistic estimate that a contract made on the outbreak of hostilities would secure in a few weeks the erection of as many huts as might be required to provide temporary hospital accommodation. It was forgotten that only with great difficulty could any such expansion be obtained at the time of the South African War. The immediate requirements for the reception of invalids were only met then by obtaining a large number of portable Doecker huts from the Central Red Cross Committee of Germany. A hutted hospital at Alton which the "Absent

Minded Beggars " fund hoped to erect in a month or two took two years to complete. Without definite preparation, therefore, beforehand, with material ear-marked for the purpose and with sites considered and prepared in advance, it was far from probable that a contract for hospital accommodation on the outbreak of hostilities would meet the immediate demands of a war in Europe. In the armies of Europe the planning and equipment of public buildings and barracks as hospitals in the event of war had been thoroughly considered and scheduled. In the United States of America plans and specifications of hospitals and convalescent depôts had also been prepared in the Surgeon-General's office. The Japanese had made provision previous to the Manchurian War for expanding their military hospitals rapidly from 200 to 10,000 and even 15,000 beds each by the erection of temporary huts whenever war broke out. All this was in marked contrast with the want of preparation in the United Kingdom. The importance of the subject was still further emphasized by the fact that in the early months of a European war the number of sick and wounded evacuated to England would probably be ten times as many as had been evacuated during the South African War. The expansion of hospital accommodation effected during that war amounted to 2,000 beds only.

The War Office committee of 1905 did not, however, provide a scheme to meet these requirements but proposed that the invalids who did not require hospital treatment should be received into a special disposal depôt which would be mobilized in each of the grouped regimental districts. The suggestion was that a barrack should be set apart for the accommodation of the disposal depôt and a special staff appointed to it. Invalids sent to it, who might require medical care, would remain in the depôt under the supervision of the medical officers normally quartered in the neighbourhood or of one or more appointed to the special staff of the depôt for the purpose. In the event of this barrack accommodation proving insufficient it was to be supplemented by the erection of temporary huts. The advantage of the scheme was that the destination of each invalid would be clearly defined on disembarkation or on discharge from hospital as a convalescent.

In November, 1905, the Army Council approved of these principles, but nothing further was done beyond the suggestion that some general instructions should be drawn up for inclusion in mobilization regulations; and arrangements were consequently made in 1906 for including convalescent depôt units in war establishments. The subject was lost

sight of, however, and not taken up in any definite form until December, 1908, when the necessity of having plans prepared beforehand for the formation of convalescent depôts in the field and at home was strongly urged by the Director-General and by the medical section of the directorate of military operations. The subject was discussed in conferences and committees at the War Office during 1909, 1910 and 1911, and eventually the Army Council approved of a scheme by which 4,750 beds in barracks at Lichfield, Winchester, Shorncliffe, and Warley should be handed over to the medical authorities as convalescent depôts on mobilization. If the barrack accommodation was not available, as was highly probable, the convalescent depôts were to be accommodated in huts, or, if the season permitted, in tents. The question of hutting was to be left till mobilization was ordered. In the meantime standard plans for convalescent depôts of 1,000 and 500 beds were prepared and approved.

It was not, however, until 1914 that a convalescent depôt was shown in war establishments and mobilization instructions as a unit of the R.A.M.C.

CHAPTER II

THE PREPARATION OF THE ARMY MEDICAL SERVICE FOR WAR—(*cont.*)

PERSONNEL AND TRAINING.

THE organization of an expeditionary force for service abroad was published in a special Army Order of 1st January, 1907. The force consisted of a cavalry division of four brigades, six divisions each of three infantry brigades, four artillery brigades, engineers and divisional mounted troops, and army troops which included two mounted brigades. The medical units allotted to this force were four cavalry field ambulances to the cavalry division, a cavalry field ambulance to each of the mounted brigades, three field ambulances to each of the divisions, and two field ambulances to the army troops. For the lines of communication provision was made for six clearing hospitals, twelve stationary and twelve general hospitals, three advanced and three base depôts of medical stores, six ambulance trains and six hospital ships, two sanitary sections and eleven sanitary squads. This remained as the general allotment of medical units for the expeditionary force until the outbreak of war, the only modification being the withdrawal of the cavalry field ambulances from the mounted brigades when these ceased to form part of the force in 1914, the reduction of the number of hospital ships from six to three in 1913 on account of the short voyages likely to be required for an expeditionary force on the continent of Europe, and the addition of a convalescent depôt to lines of communication units in 1914. A fifth cavalry brigade was added in 1914 on the withdrawal of the mounted brigades, and a cavalry field ambulance was allotted to it.

For the expeditionary force, therefore, provision had been made in January, 1914, for the regimental medical services of the headquarters of a cavalry division and 21 units of cavalry or cavalry divisional troops; for the headquarters of 6 divisions, 72 infantry battalions and 72 units of divisional troops; for general headquarters, headquarters of 2 armies, and 24 units of army troops including the headquarters and 4 squadrons of the Royal Flying Corps and line of communication troops; for 5 cavalry field ambulances and 20 field

ambulances, 6 clearing hospitals, 12 stationary hospitals, 12 general hospitals, 1 convalescent depôt, 6 ambulance trains, 3 hospital ships, 3 advanced depôts of medical stores, 3 base depôts of medical stores, 2 sanitary sections and 11 sanitary squads.

The problem which the Director-General of the Army Medical Services had from the first to face was the provision in the event of war of personnel for all these units as well as for the medical services in the United Kingdom and garrisons overseas. As already noted, the Army Medical Service at the time of the South African War was barely sufficient for peace requirements and possessed no organization for expansion in war. The most noticeable comment of the Royal Commission appointed under the chairmanship of Lord Elgin in 1903 to report upon the South African War was that " the true lesson of the war, in our opinion, is that no military system would be satisfactory which does not contain powers of expansion outside the limit of the regular forces whatever that limit may be." Two problems then confronted the Director-General: one the fixing of a limit for officers and men of the regular establishment of the Royal Army Medical Corps, and the other the organization of a system for meeting the expansion which would be necessary on the outbreak of war. None of the medical units enumerated above and none of the medical services of the regimental units with the exception of those of the Household Cavalry and Guards battalions existed in time of peace. Provision had to be made for their mobilization in time of war. In the preparation for a conflict in Europe one of the most pressing needs, therefore, was that of an adequate personnel to mobilize with the regimental units of the expeditionary force, and to provide the establishment of the medical units which would come into being at the same time.

In considering the questions that arose the problem was found to be difficult and complicated The Director-General was assisted in his consideration of it by the advisory board for medical services, who took up the question by direction of the Secretary of State in 1903 and submitted four reports to him on the subject in 1904. Conferences were also held with the volunteer and militia medical services and with representatives of voluntary aid associations. The outstanding feature of the discussions and reports was to the effect that the normal strength of officers of the R.A.M.C. was several hundreds and of other ranks several thousands below the requirements of an Expeditionary Force of 140,000

The advisory board, in submitting these facts to the Secretary of State in October, 1904, remarked "that until a large increase of R.A.M.C. personnel in officers, non-commissioned officers and men is sanctioned, this country must be prepared to face a European campaign with totally inadequate means of dealing with the sick and wounded in a satisfactory manner."

It was obvious, however, that, as regards officers, expansion must take the form of employment of civil surgeons, and, as regards other ranks, of partially trained men from voluntary aid or other volunteer sources. The advisory board placed a limit on the proportion of these. The proportion of regular R.A.M.C. officers with the expeditionary force was fixed at 55 per cent. and of civil surgeons at 45 per cent.; and the proportion of trained subordinate personnel at 64 per cent. and of partially trained at 36 per cent. In 1904, when the advisory board's report was submitted, the expeditionary force organization was that of three army corps and three cavalry brigades. It was estimated that 1,023 medical officers would be required for it, of whom 576 would be regular officers and 447 civil surgeons according to the above proportion. But at that time only 397 regular R.A.M.C. officers were available for mobilization, after making allowance for the numbers who would be necessary for the administrative and other duties in the United Kingdom and for garrisons overseas, including India. To fill up the gaps by employing untrained civil surgeons, who might volunteer on the outbreak of war, was considered inadvisable. The utility of civil surgeons was greatly limited during the South African War by their ignorance of military work, while their engagement while war was going on was attended with very great disadvantages. To meet the situation, therefore, the advisory board recommended an increase of 179 to the establishment of regular R.A.M.C. officers and the formation of an Army Medical Reserve of civil surgeons, who should be commissioned in time of peace, be liable for general service in time of war, receive an annual retaining fee, and undergo such training as would fit them for their duty on mobilization. The age limit was to be from 21 to 30 years, and the conditions of service three and a half years as lieutenant, with two months' special training on joining, with option to engage for a further three and a half years as captain, provided the applicant passed an examination for promotion and had an additional month's special training. The Treasury eventually gave its assent and the formation of an Army Medical Reserve of Officers was published in November, 1906.*

* Army Order 253, 1906.

The other personnel of the R.A.M.C. required for the mobilization of the 3 army corps and 3 cavalry brigades were 72 quartermasters and 9,081 warrant officers, non-commissioned officers and men. The strength available on mobilization at the time was only 34 quartermasters and 3,579 other ranks. The advisory board in their report considered that, allowing for the maximum proportion of partially trained men from voluntary aid sources who, consistent with efficiency, might safely be used—a number estimated at 3,306—there was a deficiency in technically trained R.A.M.C. of 38 quartermasters and 2,196 other ranks. The existing establishment of the R.A.M.C. had been " based on the distribution of the personnel among the various military districts according to the peace requirements of the troops normally quartered therein and bore no relation to the necessities of war." The board considered that there was an imperative necessity therefore for the maintenance in peace of sufficient establishment to form a nucleus round which voluntary aid organizations might be enabled to group themselves in each army corps. An increase of 1,719 men in the regular establishment of the R.A.M.C. was consequently recommended on the assumption that this increase would provide in due course a sufficient number of reservists to complete the deficiency. This proposed increase, although in excess of what was required in peace, was justified by the fact that during peace manœuvres, annual training, and the period of colonial reliefs, the establishments in hospitals were greatly reduced and had to be supplemented by employment of pensioners, civilians and regimental orderlies obtained from battalions, men, in other words, who, while they could be ill spared by their commanding officers, were useless as nursing orderlies.

With regard to the 3,306 partially trained men required to complete the establishment of R.A.M.C. with the expeditionary force, the advisory board recommended that they should be obtained partly from voluntary aid organizations and partly from special service sections of the existing R.A.M.C. militia and volunteers and volunteer bearer companies. But whatever system of expansion was adopted it was considered essential that adequate arrangements should be made in peace for the training, annual registration and periodical inspection of men whom it was proposed to supply on mobilization from voluntary sources.

This was the state of affairs as regards personnel in 1904. The Army Council, however, decided to postpone consideration of additions to medical establishments until

the question of the final composition of an expeditionary force was settled.

When, then, in 1905, the mobilization problem had been changed from 3 army corps and 3 cavalry brigades to an expeditionary force of 1 army corps of 6 divisions and 4 cavalry brigades, the question of increase in establishments of the R.A.M.C. was again brought up. The requirements were very much the same as before, and, in March, 1905, the Director-General asked for an addition of some 2,000 men to the regular R.A.M.C. and recommended that the volunteer and militia companies of the R.A.M.C. and St. John Ambulance brigade companies should be organized and equipped in time of peace to enable them to mobilize as sections of field ambulances or of stationary hospitals, general hospitals and other R.A.M.C. units, and take the places allotted in them to partially trained men on the outbreak of war.

He suggested that, to meet the shortage of regular R.A.M.C., there should be special enlistments of one year with the colours and eleven years in the reserve, and that, to meet the shortage in auxiliaries, men should be enlisted for 6 months' colour service and 11½ years in the reserve. With regard to auxiliaries, it should be noted that although, at the time, the volunteer R.A.M.C. numbered 3,122, the volunteer infantry brigade bearer companies 2,327, and the St. John Ambulance brigade bearer companies 488, or a total of nearly 6,000, it was not anticipated that a large proportion of these would volunteer for service abroad. But, assuming that 40 per cent. of them would so volunteer, this would only give 2,374 to meet the requirements of 3,306 partially trained men. It was the difference between these two figures which the Director-General suggested should be met by the new proposals. He counted on obtaining over 3,000 partially trained men amongst volunteers. But whatever numbers volunteered for service abroad it was important to remember that these volunteer services, as well as men of the Militia R.A.M.C. companies, were depended upon and earmarked for duty in the home hospitals to replace the regulars mobilized for service with the expeditionary force, and any great depletion of these by volunteering for service with the expeditionary force would embarrass the arrangements for carrying on the work in the home hospitals.

After much discussion and actuarial investigation during 1905 by the branches in the War Office concerned, a definite statement was eventually submitted to the Treasury in February, 1906, in which it was assumed that the deficiency

would be 575 in regular R.A.M.C. and 2,100 in auxiliary personnel in an estimated requirement of 5,750 fully trained regulars and 3,324 partially trained auxiliaries. It was estimated that when the army reserve of the R.A.M.C. had grown to its full normal strength there would be about 4,850 subordinate ranks available for mobilization and that 20 per cent. or 325 of the militia R.A.M.C. might be likely to volunteer and could be spared for service abroad. But at that time the regular R.A.M.C. and its reserve were 1,000 below the normal figure, and sanction for the immediate increase in establishment in the estimates for 1906–7 of 200 N.C.O.'s and men, on a 1 year's colour service and 11 years in the reserve, was asked for in order to build up an army reserve in time to meet the total deficiency. At the same time the Treasury was asked to sanction the enlisting of 1,500 R.A.M.C. volunteers into the Army Reserve, in the same manner as members of the Army Reserve forming the Army Post Office and Telegraph Corps and the Railway Engineer Corps were dealt with, in order to build up in a similar manner the estimated deficiency of 2,100 of the partially trained personnel.

This latter scheme was, however, abandoned, and the Treasury was asked to sanction instead an addition of 250 privates to the R.A.M.C. on a 1 year's colour service. At first the Treasury did not give its assent to this, on the ground that the strength of the combatant force had not yet been settled and that it had yet to be ascertained whether trained men might not be forthcoming under the Territorial Force Association scheme then being evolved, to meet emergencies not only at home but abroad. On reconsideration, however, sanction was given in June, 1906, to the increase of 250 men in the R.A.M.C. establishments, and at the same time sanction was given for the formation of an Army Medical Reserve of Officers on the conditions outlined in the first report of the advisory board in 1904.*

By the year 1906, therefore, considerable progress had been made in preparing the ground for placing the establishments of the R.A.M.C., its reserves and its auxiliary reserves on a much more satisfactory footing than previously in the event of a war in Europe.

When the Territorial and Reserve Forces Act was passed in 1907, the whole question of expansion of the medical services for war was again in the melting pot, and the position of the militia, volunteer and yeomanry medical services had to be reconsidered. Before reconstruction took place, the Army

* Army Order 253 of November, 1906.

Council, in October, 1906, had sanctioned a conference being held at the War Office between representatives of volunteer medical service officers and representatives of the St. John and St. Andrew's voluntary aid organizations. Schemes had been submitted by many of them, and also by the British Medical Association. The conference was held in December, 1906, and it was generally agreed that a volunteer medical service should be formed as part of a territorial force to take the place of the regular R.A.M.C. when an expeditionary force went overseas. It was proposed, therefore, to form a R.A.M.C. for the territorial force, which should be an exact counterpart of the regular R.A.M.C., with corresponding ranks and appointments, and with medical units organized for war on similar scales to the war establishments of the medical services of the expeditionary force.

When the Territorial and Reserve Forces Act was passed, it was intended to provide on a territorial system a force of 14 mounted brigades, 14 divisions and army troops ; provide for coast defence and supply 60 troops of cavalry for service with regular regiments of cavalry ; but when the estimate for this force was first presented to Parliament in 1907 the only medical details provided for were three field ambulances for each division, one cavalry field ambulance for each mounted brigade, and the medical details for regimental units and army troops. As there was thus no provision made for other medical units, the Director-General re-opened the whole subject in a memorandum submitted to the Secretary of State, in July, 1907, giving details of a R.A.M.C. territorial force organization, similar to that of the regular R.A.M.C., to consist of the medical and sanitary personnel for regiments, field ambulances and cavalry field ambulances, stationary and general hospitals, sanitary units, and administrative medical staffs. The total personnel required for this scheme was 1,439 medical officers, 83 quartermasters, and 17,147 other ranks.*

To meet this establishment there was already an authorized establishment of R.A.M.C. militia and volunteers of 1,070 medical officers, 29 quartermasters, and 7,782 other ranks. Provision had, therefore, to be made for a deficiency of 369 medical officers, 54 quartermasters, and 9,365 other ranks, exclusive of 10 officers and 200 men required to form the sanitary companies. In order to meet this deficiency it was proposed to reduce the peace establishment of field and cavalry field ambulances by 154 medical officers and 4,032 other ranks, and a peace establishment for the territorial force was fixed

* Allowing for casualties and wastage, the full mobilization of the units required 1,531 medical officers, 91 quartermasters, and 17,979 other ranks.

at 1,377 medical officers, 91 quartermasters, and 13,947 other ranks. In order to raise these numbers to a war footing of 1,531 medical officers, 91 quartermasters, and 17,979 other ranks, it was proposed to enlist the agency of the St. John Ambulance Association in England and the St. Andrew's Ambulance Association in Scotland.

Discussions and conferences on the subject of expansion of the medical services for war continued to take place during 1907 and 1908 with a view to disentangling the complicated situation that existed in connection with the Army Medical Reserve of Officers, the old militia and volunteer medical services, voluntary aid organizations, and the new territorial force system.

The situation was eventually cleared up by the formation out of these elements of*

(1) A Special Reserve of Officers for the R.A.M.C. under conditions similar to those of the Army Reserve of Medical Officers.

(2) A Special Reserve of other ranks on a militia basis and on a territorial force basis, supernumerary to the establishment of the territorial force R.A.M.C. units, for general service with the regular R.A.M.C. on the outbreak of war.

(3) A Home Hospital Reserve composed of members of the St. John Ambulance Brigade in England and the St. Andrew's Ambulance Association in Scotland, for staffing the military hospitals in the United Kingdom upon the mobilization and withdrawal of the R.A.M.C. for duty in the field.

(4) The formation of the Territorial Force R.A.M.C. on the lines already indicated for service in connection with home defence; sanction being given for the appointment of an officer† to the staff of the Director-General for two years to assist in the arrangements for its organization and training.

In 1909, when these various sources of expansion had had some time to develop, the Director-General reviewed the situation as regards the requirements in R.A.M.C. personnel for the expeditionary force, including first reinforcements and wastage during the first six months, calculated as 18 per cent. for the field medical units and 10 per cent. for the lines of communication units. The requirements were then estimated at 9,710 warrant officers, non-commissioned officers and men, of whom

* Army Order 271 of 1908.

† Lieut.-Colonel Sir J. Clarke was appointed on the 9th October, 1908. His appointment terminated on the 10th October, 1910.

5,955 were to be regulars or trained men and 3,755 special reserve or partially trained men. In addition to these, 221 were required for various depôts, medical stores, clerical and invaliding board duties at home, making a total requirement of 9,931.

In January, 1909, in order to augment the reserve of other ranks of the R.A.M.C., 1,000 reservists of infantry of the line with less than two years to serve were asked to volunteer for transfer to the R.A.M.C., and come up for three months' special training, and, in April of the same year, another 1,000 army reservists who had four years to serve were asked to volunteer for transfer to the R.A.M.C. 1,000 special reservists on a militia basis had also been sanctioned for medical services, as well as 3,000 special reservists on a territorial force basis to complete establishments on the outbreak of war, as partially trained reserves. However, only 363 of the latter class of special reserve had at that time been enrolled, and the Director-General applied, therefore, for another 1,000 army reservists to be transferred to the R.A.M.C., in the hope that by the time they had finished their training the R.A.M.C. Reserve would be correspondingly increased and that possibly, too, the special reserve of the territorial force R.A.M.C. would be filled up.

This was not taken up at the time, and in a subsequent memorandum by the Director-General in November of the following year it was estimated that the shortage of trained men then amounted to 1,689, and of partially trained men to 534. His proposals, however, to meet the situation by the transfer of another 1,000 infantry reservists to the R.A.M.C. Reserve were not accepted on financial grounds, and the Director-General, after considering material reductions in the proportion of trained men in the various field medical units, came to the conclusion that it would be possible to complete the mobilization of the medical services of the expeditionary force on the establishments for which financial sanction had been given, namely 4,460 regular R.A.M.C. and regular reservists, 1,500 higher trained non-regulars on a militia basis, and 3,755 lower trained non-regulars on a territorial force basis.

The formation of the territorial force R.A.M.C. was by this time well advanced, and the number of medical officers enrolled in regimental units was in some instances greatly in excess of the two sanctioned as establishment of the units. Many of the medical officers who were associated with the old volunteer regiments retained their association with them when they were re-constructed on a territorial force basis, and, as there was no limit to the number of medical officers in the old

volunteer battalions, they became supernumerary to the establishment of the territorial force units which took their place. This, however, was regarded as a satisfactory set-off against a failure of the special reserve of officers in the earlier years of its existence to attract young medical men. In fact, the universities and medical schools had to be visited by officers of the Director-General's staff during 1909 and 1910 to address the medical students in their final year of study and urge them to join the special reserve on becoming qualified. This met with a certain measure of response, and the special reserve of officers R.A.M.C. rose from 24, 34, and 92 in the years 1908, 1909, and 1910, to 116, 142, and 191 in 1911, 1912, and 1913, and by the 30th June, 1914, had reached 248.

Further assistance in organizing a reserve of medical officers with military training was obtained by the formation of medical companies of the Officers' Training Corps. This corps was the outcome of the proceedings of a committee under the chairmanship of Sir E. Ward, Permanent Under-Secretary for War, and was instituted for the purpose of giving students at schools and universities a standardized measure of military training with a view to their taking commissions in the regular army, special reserve, or territorial force. Two divisions were formed, a junior division at schools and a senior at universities. Medical units were formed in the senior division only and at the large universities where there were medical schools. A retired officer* R.A.M.C. was attached to the military training branch of the General Staff to arrange and supervise the organization and training of these units. The number of cadets necessary for the formation of a unit was 30, and if over 90 were enrolled at any medical school, a second unit was formed there. The basis of training was that of a section of a field ambulance. In this way Edinburgh, Oxford and Cambridge Universities in 1908, London University in 1909, Dublin and Belfast Universities in 1910, and Aberdeen University in 1912, formed medical units of the Officers' Training Corps. Of these, London University formed four units and Edinburgh two, the others one unit each. The approximate number of cadets in training at any one time was 500, and the average length of training two and a half to three years. Altogether some 1,900 medical students passed through the Officers' Training Corps in the period between the formation of the medical units and the outbreak of war. The importance of this element in ensuring a supply of medical officers with military training

* Lieut.-Colonel H. E. R. James.

to make good deficiencies in the establishment of medical officers for the expeditionary force, on mobilization and afterwards, proved incalculable during the war.

The formation of the Home Hospital Reserve was sanctioned from the 1st April, 1908, although provisional arrangements had been entered into in the previous year. It consisted of officers and other ranks. The St. John Ambulance Brigade undertook to provide on the outbreak of war the personnel required in the military hospitals in England and Ireland, and St. Andrew's Ambulance Association those in Scotland. The requirements of the home commands was at first estimated at 382 medical officers, 29 quartermasters, and 2,727 other ranks. This establishment was sanctioned in February, 1910, and by 1911, 2,200 men had been enrolled in the reserve from the St. John Ambulance Brigade and 82 from the St. Andrew's Ambulance Association.

A scheme was carried out for training the Home Hospital Reserve of quartermasters and non-commissioned officers in military hospitals for eight days every two years, and more detailed tables were subsequently prepared showing the requirements of each command. The estimate then was that 392 medical officers and 2,632 other ranks would have to be obtained from the St. John Ambulance Brigade and 19 officers and 95 other ranks from the St. Andrew's Ambulance Association. On mobilization, all of the personnel would receive corresponding rank in the R.A.M.C., officers being commissioned and other ranks being enlisted into it with permission to wear the uniform of their voluntary aid organization. This reserve was, therefore, considered adequate for the purpose of replacing the regular R.A.M.C. personnel in home hospitals on mobilization.

As regards the territorial force R.A.M.C., there was no lack of medical officers and personnel for the field medical units. Twenty-three territorial force general hospitals, staffed by local medical men, who received commissions ine th R.A.M.C., T.F., were being planned in localities in touch with medical schools, and the necessary contracts were being entered into to take over buildings and equip them on mobilization. But it was pointed out by the directorate of military operations that provision had only been made for regimental and field ambulance personnel with divisions and for general hospitals on lines of communication, and that no units had been provided to correspond with the clearing hospital, ambulance trains and stationary hospitals of the expeditionary force. In the event of invasion the field medical units would consequently be clogged with wounded, and there would be great

confusion and difficulty in freeing the fighting forces of the masses of wounded collected after battle.

The Director-General was not in a position at the time to apply for any addition to the estimates for medical services of the territorial force to meet this obvious defect in the organization of the medical services of the territorial force, and he applied to the medical section of the directorate of military operations to suggest a scheme by which these gaps in the collection and evacuation of wounded in the event of invasion might be filled. A scheme was consequently submitted for meeting the requirements by organizing and utilizing voluntary aid in the form of voluntary aid detachments, similar to the organization of voluntary aid detachments in Japan and other countries. They were to undertake the duties of forming clearing hospitals and collecting wounded through them from field ambulances to railhead; of taking care of the wounded during transport by train to the general hospitals, and of establishing rest and refreshment stations at halting places along the line of railway and auxiliary hospitals throughout the country for the reception of those unfit for further transport. Men's detachments were suggested for the duties of collection and transport, and women's detachments for those of rest stations and auxiliary hospitals. This was the origin of the voluntary aid detachment movement throughout the United Kingdom. The scheme was issued by the Secretary of State for War on the 16th August, 1909, to the secretaries of territorial force county associations, who were asked to make use of the existing organization of the British Red Cross Society and the St. John and St. Andrew's Ambulance Associations for the formation of unlimited numbers of men's and women's voluntary aid detachments, the composition and duties of which were defined.

The movement met with enthusiastic response in every county of England and Scotland, and by the beginning of 1914 as many as 519 men's and 1,757 women's voluntary aid detachments had been registered at the War Office. Unfortunately there was an unhappy and apparently an insurmountable misunderstanding in some counties with regard to the raising and registering of voluntary aid detachments. In the scheme sanctioned by the Secretary of State the detachments were to be raised through the territorial force associations by the British Red Cross Society, but only persons who had obtained the St. John Ambulance Association or St. Andrew's Ambulance Association certificates could be enrolled in them. County directors of voluntary aid were appointed by the British Red Cross Society to raise the detachments and generally act as their medium of communication with the territorial force

county associations. This arrangement worked well at first, but as the movement became more extensive and popular complaints were made by various individuals of their inability to enrol without going to the expense of attending a course of lectures for the St. John Ambulance Association certificates, while other educational bodies complained because their ambulance certificates were not accepted by the British Red Cross Society as qualifying for enrolment in its voluntary aid detachments. It was consequently decided that other ambulance certificates than those of the St. John Ambulance Association should be a qualifying certificate; but, as this altered the arrangement, by which, while the Red Cross Society alone was empowered to raise voluntary aid detachments, the order of St. John had the exclusive right of qualifying members for enrolment in them, it was decided not to restrict the power of raising voluntary aid detachments to the British Red Cross Society's organization, but to extend the power to the St. John Ambulance and the St. Andrew's Ambulance Associations as compensation for the loss of the exclusive right of giving the qualifying certificate.

As both these associations as well as the British Red Cross Society had their county organization, the county interests of the Red Cross Society and St. John Ambulance Association came in conflict with one another. The situation, in fact, became so acute that in the summer of 1914 a committee was formed at the War Office under the chairmanship of Sir Walter Lawrence "to enquire into and report on the difficulties which had been experienced in co-ordinating the work of the societies and associations in forming, registering, training, administering and controlling voluntary aid detachments, and to make suggestions for amending existing schemes for the organization of voluntary aid detachments with a view to the removal of such difficulties." The War Office, Territorial Force, Order of St. John, the British Red Cross Society, and the St. Andrew's Ambulance Association were represented on the committee. It met for the first time on 3rd July, 1914, but after the fifth meeting war had been declared and the work of the committee for the time being was abandoned.

The evidence, so far as it went, emphasized the difficulties of a county organization by which the Red Cross Society, the Order of St. John, and the Territorial Force County Association might each raise voluntary aid detachments. The territorial force county association was responsible to the War Office and was the medium of communication with the War Office in connection with voluntary aid detachments. It might delegate its power of raising detachments to the other bodies or raise them itself.

Consequently, when the power was delegated in a county to the Red Cross Society, difficulties were put in the way of the St. John Ambulance Association registering detachments from its own members in that county ; and, on the other hand, the Red Cross Society had similar difficulties in a county where the St. John Ambulance Association was predominant and had its own county director. There was strong evidence of the need of a central committee to control organizations for voluntary aid in war on which all interests concerned, including the War Office, should be represented. Although Sir Walter Lawrence's committee ceased to carry on its enquiry and submitted no report after the outbreak of war, further friction between the British Red Cross Society and Order of St. John was avoided by the formation of a joint committee of the two bodies during the war.

Great Britain had been for years notoriously backward in realizing the necessity of organizing voluntary aid for war and co-ordinating it, under War Office control, with the requirements of the medical services. The popular mind had for long been under the impression that voluntary aid, untramelled by official control, would be the best, most prompt and readiest means of succouring wounded on the battlefield, and even in the year 1914 popular demonstrations of voluntary aid detachment work arranged by the British Red Cross Society only encouraged this impression. The Geneva Convention of 1906 for the first time recognized and defined the position and activities of voluntary aid societies in the field. The emblem and expression " Red Cross " were rigidly restricted to the official medical services of armies, and societies were only permitted to use the emblem and term if duly recognized by their Government as forming an integral part of the medical services in war. But with the exception of the co-ordinating control of voluntary aid exercised between the years 1899 and 1904 by the Central British Red Cross Committee at the War Office, the tendency of voluntary aid organizations both before and afterwards was to keep clear of association with the War Office. The fallacy and disadvantages of this conception were apparent immediately war was declared. It is true that the territorial force county associations acted as the local controllers of voluntary aid schemes, but there was no co-ordinating authority associated with the War Office* through which the local branches of the Red Cross Society and Ambulance Associations might be guided in their activities for organizing

* There was a Technical Reserve Advisory Committee on Voluntary Aid at the War Office, on which various voluntary aid organizations were represented. It was constituted apparently to deal only with questions of reserves of personnel for medical services.

and training their members to supplement the official medical services in time of war.

With all these resources more or less definitely organized to provide the regular Army Medical Service with powers of expansion in the event of war in Europe, the lesson of the South African War, as enunciated by the Royal Commission in 1903, had been well learnt and practised by the year 1914.

But in preparing for war the importance of expanding the nursing service was not forgotten. Queen Alexandra's Imperial Military Nursing Service was inaugurated in 1902. Its organization embodied the recommendations of the committee which had been appointed in 1901 to consider the re-organization of the military nursing service. Previously there was an army nursing service of 88 lady nurses, supplemented by an army nursing service reserve, initiated by H.R.H. Princess Christian in 1896 and officially recognized and constituted in Army Orders of March, 1897. This reserve played an important part in the military nursing service both during and after the South African War. 805 of its members served in South Africa during that war, 33 at various other stations abroad, and 538 at home stations on various occasions. The reserve was controlled by a committee at the War Office. After the South African War and when Queen Alexandra's Imperial Military Nursing Service was constituted, many stories were spread, reflecting on the conduct of nurses of this reserve. They were without foundation but caused much trouble and unhappiness to its members. They originated in the fact that during the South African War a number of ladies and others were appointed locally to the nursing service in South Africa without reference to the Committee of the Army Nursing Service Reserve and without examination into their qualifications. Instances of incompetence amongst some of these irregularly appointed nurses were wrongly attributed to the Army Nursing Service Reserve, and in 1903 a question arose as to whether this reserve should still be officially recognized. Its continued existence was, however, definitely approved on the conditions under which it had been officially recognized in 1897. It was to be directly under the War Office, have no official connection with the Q.A.I.M.N.S., and be outside the control of the Nursing Board. The Q.A.I.M.N.S., on the other hand, reserved to itself the sole and absolute right both in peace and war of appointing nurses for service in military hospitals, but in the event of war would, in selecting nurses, give first consideration to the Army Nursing Service Reserve and appoint members of that service who fulfilled the requirements of the Nursing Board.

The Army Nursing Service Reserve nurses continued to be employed in military hospitals at home and abroad until 1910, when a Q.A.I.M.N.S. Reserve was established. In 1913 the strength of the Army Nursing Service Reserve was 469, and it was then considered how far the nurses on its books could be utilized in time of war, in view of the fact that the Q.A.I.M.N.S. had by that time formed its own reserve. This resulted in a classification of the existing members into three classes, namely those approved by the Nursing Board as suitable for employment, those suitable to supplement the first class should their services be required, and those found unsuitable. In this way the reserve was for all practicable purposes gradually absorbed into the Q.A.I.M.N.S. Reserve, and the last meeting of its committee of which there is any record was in January, 1913, although in September, 1914, there were 337 names on its roll.

The Q.A.I.M.N.S., when it was formed in 1902, had an establishment of 112, which was increased in subsequent years to over 290 before the outbreak of war. Its reserves were then drawn from the Army Nursing Service Reserve, the Q.A.I.M.N.S. Reserve, and a civil hospital reserve formed in 1911 to supplement, from the civil hospitals in the country, the nursing services in the military hospitals of peace garrisons on the outbreak of war. The number of this last reserve was 800 in 1914.

The scheme for the organization of the Army Nursing Service was based upon the provision of a matron and eight nursing sisters or staff nurses for every 100 beds in military hospitals having that number of beds or more. The establishment originally sanctioned on this scale in 1901 was 230, and until this establishment was obtained members of the Army Nursing Service Reserve continued to be employed in military hospitals both at home and abroad. The original establishment of 230 for the Q.A.I.M.N.S. was increased year by year, a general sanction having been given for an establishment of 382 without special authority and a maximum of 411 with special authority. As the numbers increased so the number of Army Nursing Reserve who were employed in military hospitals decreased.

A Territorial Force Nursing Service was also organized, with its own Matron-in-Chief* and its own Nursing Board, for the purpose of staffing the 23 territorial force general hospitals. The principle on which this nursing service was organized was similar to that of the medical staff of the territorial force general hospitals. The members enrolled in it were matrons and nursing staff of the large civil hospitals connected with the

* Miss S. Browne, after vacating the appointment of Matron-in-Chief of the Q.A.I.M.N.S. in 1906.

medical schools of the localities where the general hospitals were to be established. A Territorial Force Nursing Service Reserve was also formed by enrolling reserve nurses in each of the general hospital centres. There were thus 23 centres and, in each, 31 members of the T.F.N.S. Reserve had been enrolled, or 713 in all when war was declared. In addition, 402 had been enrolled in the reserve at the headquarters of the T.F. Nursing Service at the War Office for general service. The T.F.N.S. had an establishment of 112 members in each T.F. general hospital and so had a strength of 2,576, exclusive of its reserve, ready for mobilization when war broke out.

The trained personnel for nursing services was still further increased by enrolling in the Q.A.I.M.N.S. a nursing section of men of the R.A.M.C. who were specially trained by the Q.A.I.M.N.S. nursing sisters, matrons and medical officers, had gone through a period of probation, were successful in examinations for a certificate in nursing, had completed three years training, and were in other respects suitable. Men of the R.A.M.C. were also eligible for special training as masseurs and as attendants in operating rooms and in skiagraphy and electro-therapeutics.

All these changes in army medical personnel, made with the object of providing an adequate reserve to the Army Medical Service in time of war, brought medical men, nurses, and others engaged in civil pursuits in much closer touch than formerly with the regular R.A.M.C., with its requirements and with military conditions generally. Their influence on the efficiency of the arrangements for the care of the sick and wounded cannot be emphasized too much. But a conglomeration of medical units and a personnel in numbers sufficient to staff them would still constitute a mass of elements lacking cohesion and floundering in ignorance of the measures which should be taken to carry out their duties, had no arrangements been made for their training. Nor could proper use be made of them unless the staff of the army and officers commanding formations and units were given training in the organization and requirements of the medical services.

The period between the South African War and the European War was, fortunately, a period in which marked advances in this respect took place. Important changes were effected not only in the professional education of the regular medical officer, but also in the graduated training of officers and men of the R.A.M.C. in their administrative and military duties in the field, and of staff officers and other branches of the army in the administrative and sanitary requirements of the medical services

The first important change was the uprooting of the army medical school from Netley, where it was considered to be out of touch with the progressive thought and practice of surgery and medicine in the great medical schools, and transferring it to London in the form of a Medical Staff College.*

Treasury sanction was obtained in June, 1902, for preliminary steps being taken; provision was made in the estimates for the year 1903, and the erection of the present Royal Army Medical College at Millbank was commenced. Pending its erection temporary premises, at first in the Hotel Belgravia in Victoria Street, and afterwards in the St. Ermin's Hotel, were occupied as an R.A.M.C. mess during the courses of instruction of captains for promotion and the lieutenants R.A.M.C. on probation. The laboratories of the Royal College of Physicians and Surgeons on the Embankment were hired for their technical training in military hygiene and pathology. The senate of the Army Medical School was abolished and the control of studies at the Medical Staff College in London was taken over by the advisory board for medical services at the War Office, with a college council of the professorial and teaching staff, under the commandant. A board of studies was constituted consisting of the Director-General or his deputy as president, the commandant of the college, and one military and one civilian member of the advisory board, together with the professors of military hygiene and pathology and an officer of the Indian Medical Service, nominated by the India Office, as members.

The permanent buildings were opened in 1906, and in 1907 the Queen Alexandra's Military Hospital at Millbank and the Medical Staff College, now called the Royal Army Medical College, were combined under the one administrative control of the commandant of the college. Senior as well as junior courses of instruction were organized, the former for captains who were required to pass an examination in professional subjects previous to promotion to major's rank, and the latter, as before, for lieutenants on probation. The senior course was for six months, extended in 1912 to nine months. It became one of the most thorough and important post-graduate courses for the medical profession in the United Kingdom The educational resources of the London medical schools were

* The question was taken up by the Secretary of State in 1901 on the recommendation of Mr. Brodrick's Committee on the reorganization of the Army Medical Service, and the opinion of the advisory board on medical services was sought. The advisory board strongly supported the recommendations and submitted sketch plans for the site of a mess building and laboratories at Millbank.

at its disposal, while the technical training in military hygiene and pathology was carried out in the college itself. It was recognized as one of the medical schools of the University of London in October, 1908; as a teaching institute, as regards pathology, for the degree of Bachelor of Medicine of the University of Cambridge in 1910, and for instruction in operative surgery for the diploma of Fellow of the Royal College of Surgeons. The association of officers of the Royal Army Medical College with the members of the civil medical profession, an association which proved of far-reaching importance during the war, was thus cemented still more closely.

The Inspector-General of the Forces, in reporting on an inspection of the R.A.M.C. establishments at Aldershot in 1908, remarked that "in order to ensure the smooth working of medical services in the field it is necessary that medical officers should be trained in peace time, be practised in adapting their arrangements to military situations based on definite schemes, and it is no less necessary that staff officers should become fully acquainted with the possibilities and limitations of the authorized medical organization." He suggested that to further this end instruction in the principles of staff duties in the field should be given at the Royal Army Medical College. A War Office committee was consequently appointed, under the chairmanship of Colonel Kiggell, Assistant Director of Staff Duties, to consider and submit recommendations on the general scope of the instruction to be given in lectures at the R.A.M. College; and of the instruction in field duties to be carried out in commands. The proposals included lectures by the A.G.'s, Q.M.G.'s, and general staff; the attendance of medical officers at war games, staff rides and special staff rides for medical services; and a syllabus of training for field medical units and the medical units of the Officers' Training Corps. The committee pointed out that the work of R.A.M.C. officers involved such military subjects as the professional supervision of sanitary measures, the collection of sick and wounded, the compilation of records regarding them, arrangements for their transportation from the front, the discipline and maintenance of combatants under their care, the replenishment of medical and surgical supplies, the provision of food, clothing and other requirements of their men; the care and management of transport allotted to them, arranging their camps and movements and fitting their units into their allotted place on the line of march, and generally exercising the same functions as officers of other units with the sole exception of actual combatant work. Further, while officers of the R.A.M.C. are not charged with combatant duties,

they are intimately concerned in the combatant work of other branches, and the efficient performance of their duties on the battlefield demanded some knowledge of tactics and the general principles on which military operations are conducted; they must also be capable of understanding from an operation order what is likely to be required of them and be capable of issuing orders in accordance with the field service regulations governing them. The committee, keeping in view these general principles, submitted an exhaustive review of the scope of the training which should be given to the Royal Army Medical Corps officers, together with a syllabus of graduated training of medical units and all ranks of the R.A.M.C. in camps of instruction, including the training to be given to the medical units of the territorial force in their annual training camps. Instructions were consequently issued by the Army Council to all commands at home and abroad in April, 1908, drawing attention to the importance of practising medical officers in adapting their arrangements to military requirements, and also of staff officers becoming fully acquainted with the possibilities and limitations of the authorized medical organization. Commanders-in-Chief were asked to arrange staff tours to instruct medical officers, especially in such subjects as map reading and the general principles of tactics, strategy, and administration. The syllabus for the graduated training of the medical units and personnel of the R.A.M.C. was added as a special chapter on Field Training to the Manual of Training of the R.A.M.C.

The general outlook of medical officers on the subject of field medical organization and training for a war of magnitude in Europe was further widened by the publication of handbooks, compiled in the medical section of the directorate of military operations, on the history and organization for peace and war of the medical services of the armies of France, Germany, Italy, Russia, Austria-Hungary, Belgium, and the Netherlands. Under the same influence medical manœuvres were for the first time sanctioned and a scheme prepared, based on a report by the officer in charge of the medical section of the military operations branch on medical manœuvres at which he had been present in France. The first of the manœuvres of this kind took place in the Salisbury Plain area in 1910, and similar manœuvres were held in India in the winter of 1912–13 in the Northern Command at Rawalpindi, and of 1913–14 in the Southern Command at Poona.

The general system of training medical services was extended by the Imperial General Staff to the medical services of overseas dominions, and some of their medical officers, notably

from Canada, went through courses of instruction in England. Thus when war was declared in 1914 there was a more or less uniform system of training for the regular R.A.M.C., for the R.A.M.C. special reserve, the territorial force R.A.M.C. and Officers Training Corps, for the military medical services in India, and for the medical services of overseas dominions.

As regards the training of staff officers in the organization and requirements of the medical services, the importance of the subject was forcibly impressed upon the War Office in connection with a staff ride held by the Director of Staff Duties in May, 1907.* During the progress of the exercise it was evident that the field medical organization which had been introduced after the South African War, with such new units as field ambulances, cavalry field ambulances, clearing hospitals, sanitary sections and sanitary squads, was not understood by the officers taking part in the staff ride, and this led to a desire to have special instruction on the subject by means of lectures at the Staff College. The first of these lectures was given in December, 1907. It enunciated the principles of field medical organization, the zones of collecting, evacuating and distributing casualties, the linking together of the medical units in the different zones, details regarding the organization and employment of the regimental medical service and of the various medical units; the influence of modern advances in medical and surgical science and of the Geneva Convention on the problems of dealing with casualties in the field; the quantity and classification of sick and wounded; the nature, amount and use of different forms of ambulance transport material, and of special units for removal of wounded; the calculation of the time required to collect and evacuate wounded, and various problems connected with the handling and disposal of medical units in different military situations; considerations, in other words, which constitute the strategical and tactical employment of medical services, a subject which had scarcely received recognition or been formulated in connection with the British Army until then. The lecture was printed and issued by the general staff to commands and units and was followed by a similar lecture at the Cavalry School, Netheravon, in September, 1908, dealing with those special points which affect the work of medical services during cavalry operations in the field†. Lectureships on Medical Services were subsequently established at the Staff

* See *Journal of the R.A.M.C.*, vol. ix, p. 350, for medical report on this staff ride.

† The lectures were given by Lieut.-Colonel W. G. Macpherson and were published in the *Journal of the R.A.M.C.*, vol. xii, pp. 78 and 197.

College in Camberley and Quetta,* and the principles enunciated in these lectures embodied in Field Service Regulations, Part II, issued in 1909, and in the R.A.M.C. Training Manual, issued in 1911.

The changes which were thus effected in the period between the South African War and the War in Europe in administration, field organization, personnel, and power of expansion, in professional education and staff training, placed the medical and sanitary services in an infinitely better state of preparation than they had ever been in any previous period; and to this fact must be attributed, in a large measure, the exceptional freedom from adverse criticism with which they stood the test of war.

* Lieut.-Colonel M. W. Russell became lecturer at the Staff College, Camberley, and Colonel W. G. Macpherson lecturer at the Staff College, Quetta, in addition to their other duties.

CHAPTER III

MOBILIZATION OF THE MEDICAL SERVICES

IN the event of war mobilization was so arranged that the medical services of the expeditionary force, of the territorial force and of home and colonial defences, as well as certain organized elements of voluntary aid, would take up their appointed places automatically. None of the medical units of the expeditionary force, however, existed as such in time of peace, and in this respect their mobilization differed from that of other units of the force. But the mobilization scheme provided for bringing the personnel, transport and equipment of the R.A.M.C. units together at definite places of assembly on the outbreak of war.

The preparations for this, which grew up in the years immediately preceding, bore ample fruit when mobilization orders were issued on the 4th August, 1914. The details of mobilization were known to all officers of the army medical service through the " Mobilization Instructions, Army Medical Service " and " Field Service Manual, Army Medical Service (Expeditionary Force) " issued in time of peace.* Each officer and man was in possession of a document or card containing precise instructions as to which unit or appointment he would join. Consequently, when the expeditionary force mobilized for active service overseas, the whole personnel of the army medical service required for its medical units went at once to their places of assembly, where medical comfort panniers, ordnance equipment, transport vehicles, horses and drivers, were also collected. There was practically no hitch and, with the exception of the ambulance trains, the details of mobilization worked out on the whole smoothly and well, although one or two practical points, such as the arrival of riding and draught horses at the place of assembly of a medical unit in advance of their picketing gear or of their drivers and attendants,† caused some temporary embarrassment in a few cases. The late arrival of non-commissioned officers also occasionally created difficulties, but these were difficulties which only stimulated the initiative of commanding officers and were readily overcome.

* The latest edition had been published in 1914.

† Drivers and horse attendants belonged to the Army Service Corps, and were attached to medical units.

The medical units which thus mobilized in August immediately after the declaration of war were five cavalry field ambulances, twenty field ambulances, six clearing, twelve stationary and twelve general hospitals, one convalescent depôt, the personnel of six ambulance trains, three hospital ships, three advanced and three base depôts of medical stores, two sanitary sections and eleven sanitary squads*.

The R.A.M.C. and nursing personnel required for each of these units was as follows:—

Unit.	Officers.	Other Ranks.	Q.A.I.M.N.S.
Cavalry Field Ambulance	6	118	—
Field Ambulance	10†	224	—
Clearing Hospital	8†	77	—
Stationary Hospital	8†	86	—
General Hospital	21†	143	43
Convalescent Depôt	3†	3	—
Ambulance Train	2	45	—
Hospital Ship	4	28	4
Advanced Depôt Medical Stores	1	5	—
Base Depôt Medical Stores	2†	8	—
Sanitary Section	1	25	—
Sanitary Squad	—	5	—

Officers and other ranks of the R.A.M.C. had also to mobilize with regimental units of other branches of the service. Their medical equipment was already kept in the mobilization store of the unit concerned, or stored in the military hospital at its place of mobilization or in other conveniently placed stores. Each infantry battalion had attached to it on mobilization one officer and five men of the R.A.M.C.; a field artillery brigade, a divisional train and a divisional ammunition column, one officer and three men; a cavalry regiment and brigade of horse artillery, one officer and two men; and there were smaller units with a proportionate number of men of the R.A.M.C.‡

Consequently 15 cavalry regiments, 2 horse artillery and 24 field artillery brigades, 78 infantry battalions, 6 divisional trains and 6 divisional ammunition columns, signal and field companies of the Royal Engineers, and minor units of army troops and lines of communication had to be provided with their attached medical personnel on mobilization.§

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* See Appendix A. † These figures include one quartermaster.

‡ The men of the R.A.M.C. were nominally attached to units for water duties; but they became in fact trained R.A.M.C. orderlies under the medical officer for general medical work, especially during battle.

§ This R.A.M.C. personnel had all been told off to their units by mobilization cards previous to the declaration of war.

In addition to these, administrative and executive medical officers and men were detailed for General Headquarters, for the headquarters of divisional formations, for the headquarters of the lines of communication, for each of the three bases of disembarkation of the expeditionary force and for an advanced base. The total requirements of the expeditionary force in accordance with this scale of R.A.M.C. personnel for regimental and medical units and headquarters of formations were estimated to be about 800 medical officers, 56 quartermasters, and 9,000 other ranks, together with 528 members of the Q.A.I.M.N.S.

The number of officers, nursing sisters and men on the active list in the United Kingdom was, however, very much short of these numbers when war was declared. On the 31st July, 1914, the total number of regular officers of the Army Medical Service on the active list was 1,048, and of quartermasters 42 ; while that of other ranks was 3,797 ; but, of these, 333 officers were on the Indian establishment and 229 officers and approximately 1,300 other ranks at other stations abroad. 83 officers were also required for the War Office and home appointments in accordance with the general scheme of mobilization, so that only 406 regular R.A.M.C. officers were immediately available for mobilization with the expenitionary force. There were, however, on the reserve of officers, that is to say, on the retired list and liable to be recalled for service, 119 officers* and 10 quartermasters of the R.A.M.C. ; and there were also 248 officers enrolled in the R.A.M.C. special reserve, while the regular reserve of other ranks numbered 4,937 and the special reserve 1,435.

It was known that neither the reserve of officers nor the special reserve would be sufficient to complete the mobilization of the medical services of the expeditionary force, but it had been anticipated that many civil medical practitioners would offer themselves for service in the event of war. In fact, the " Field Service Manual " provided for a definite proportion of the officers of the various medical units, amounting in all to between 45 and 50 per cent.,† to be obtained from the civil medical profession or special reserve.

Reliance was placed on obtaining the number of qualified

* Nineteen of these, as well as 38 not liable to be recalled to service, were already employed, mostly in charge of small military hospitals at depôts in the United Kingdom.

† The number of civil surgeons allowed in war establishments for 1914 was two in a cavalry field ambulance, three in a field ambulance, four in a clearing and stationary hospital, fourteen in a general hospital, and one in a convalescent depôt and ambulance train ; or a total of 381 with the expeditionary force.

medical men, who might be required to complete the war establishments on mobilization, by advertisements in the press. This was, indeed, one of the pre-arranged features in the mobilization of the medical services and immediately war was declared the advertisements appeared. Civil medical practitioners responded in large numbers. Those selected were commissioned as temporary lieutenants in the R.A.M.C. Their contract with the War Office was for twelve months or until their services were no longer required. They were granted pay of twenty-four shillings daily, inclusive of all allowances except travelling allowance, and an outfit allowance of £30 and a gratuity of £60 on the termination of their engagement.

The required number of quartermasters was obtained by promotions from the ranks ; and a deficiency of some 800 in the other ranks of the R.A.M.C. after the reserve and special reserve had been called up* was made good by the enlistment in the R.A.M.C. of men who in civil life had been employed as sick attendants, male nurses, cooks, and dispensers, as these employments avoided the necessity of training them for such special duties.

The Q.A.I.M.N.S. had a strength of 290 on the active list and 173 in its enrolled reserve at the beginning of August, 1914 ; but Princess Christian's Army Nursing Service Reserve continued to have a large number of nursing sisters on its books, and the civil hospital reserve was also available for replacing the Q.A.I.M.N.S. in the home hospitals. The requirements of the expeditionary force medical units, as regards nursing services, were met from these sources.

The expeditionary force by these means of expansion mobi lized complete as regards medical personnel. Its medical units were also complete in medical, ordnance and other supplies and transport by the time they were required to proceed overseas, with the one exception of the six ambulance trains, equipment for which was not complete when war was declared nor did their equipment mobilize with the personnel and proceed to France. The trains were to be assembled in France, each consisting of 33 special goods trucks, with brake vans for stores, office and dispensary, a restaurant car or van fitted as a kitchen, and first and second-class coaches for the personnel. Each truck was to be fitted with four stretcher frames of the Brechot-Desprez-Ameline type used in the French Army, carrying three stretchers each.

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* It is worthy of record that of the 6,000 and more reservists of all classes called up, only 17 failed to appear. The absentees were probably men who had died or being in some distant part of the world did not receive their mobilization notices in time.

For the six ambulance trains, therefore, 792 stretcher frames and 2,376 field stretchers were required. It was intended that they should be handed over to the personnel at the place of assembly of the trains in France. Not only, however, was the number of stretchers deficient, but other ordnance stores, such as ward utensils, were not available at the place of assembly of the trains. The declaration of war, consequently, found the medical services incomplete as regards equipment for its ambulance trains ; and for a time a situation was created which threatened a serious breakdown in the arrangements for the evacuation of sick and wounded and gave rise to many complaints.*

The ambulance trains were, in fact, the one blot in the mobilization of the medical units, and their failure to mobilize complete with full equipment exemplified a lesson which had been learnt at the time of the first Egyptian Campaign in 1882, namely, the importance of medical units mobilizing and moving to their destinations complete in every respect. The lesson had been well learnt as regards the other medical units. Their equipment no longer went overseas without their personnel or their personnel without their equipment. It was not, of course, expected that locomotives or rolling stock of ambulance trains could be mobilized otherwise than as arranged for in France or in other theatres of war ; but the maintenance of the fittings for the trains and equipment for them in mobilization stores in the

* According to the diary of the D.D.G., A.M.S., at the War Office, it would appear that the immediate completion of the contract for 1,100 stretchers, for the supply of 2,000 more, and for authority to purchase ordnance stores for the six ambulance trains was urged on the 31st July, 1914, in anticipation of war being declared. As there was still doubt about the possibility of having them ready in time, on the 10th August, 1914, it was proposed to use the stretchers of the clearing hospitals for the trains and replace them in the clearing hospitals by cots. In fact, the D.M.S. wrote from France to the D.G., A.M.S., on the 20th August, saying : " deficiency of stretchers for fitting out ambulance trains is causing great inconvenience. I shall be compelled to rob clearing hospitals." In a later letter, dated the 9th September, 1914, the D.M.S. further reported that complete ordnance equipment, such as ward utensils, was not available and an officer was sent to Paris to purchase articles there. Until February, 1914, experiments had been going on to determine the fittings of the six ambulance trains for overseas ; and as a result of these experiments 792 stretcher frames were entered for the first time in the War Reserve Schedule reprinted in June, 1914. Provision was also made for 1,100 stretchers to be added to the stock of stretchers in war reserve during 1914–15 ; and a contract for the supply of these was made for delivery at the rate of 70 per week commencing on the 3rd July, 1914, and terminating on the 18th October. When war was declared further orders were at once placed, and 930 stretchers were sent to France in August and 5,019 in September, 1914. The number of stretchers eventually supplied reached a very high figure. The fact that it was only in February, 1914, that the fittings of the ambulance trains were definitely decided upon and that provision was made for only 1,100 stretchers in the estimates of 1914–15 out of the total required appear to have been the factors which prevented the equipment of the trains being ready when war was declared.

United Kingdom and the embarkation of personnel and equipment together, as was done later on when ambulance train units were despatched to Macedonia were just as important in the case of ambulance trains as in the case of other medical units.

In the plan of medical organization for war it was contemplated that one sanitary section would be required for each base. As there were three bases, where troops disembarked, as well as an advanced base, the two sanitary sections mobilized would appear to have been insufficient. It was no doubt intended to make good this deficiency by utilizing the sanitary squads, which in themselves were equivalent to two sanitary sections, although nominally intended for detached work at entraining and detraining stations on the lines of communication.

But whatever other defects in the scale of units or their equipment may have been brought to light at a later period after the expeditionary force embarked for France, the mobilization of medical services so far as the scheme of mobilization was concerned may be said to have been successfully and expeditiously carried out.

Surgeon-General T. P. Woodhouse was appointed director of medical services of the expeditionary force. He mobilized with General Headquarters in London from the appointment of D.D.M.S., Aldershot, and proceeded to France on the 9th August, 1914. His staff consisted of two assistant directors: Lieut.-Colonel D. D. Shanahan for staff duties and Lieut.-Colonel W. W. O. Beveridge for sanitation. Colonel M. W. O'Keeffe mobilized as his deputy director of medical services on the lines of communication, with Major J. V. Forrest and Major H. B. Fawcus as his deputy assistants for staff and sanitary duties respectively.* An assistant director of medical services was appointed to the advanced base† and to each of the three sea bases, Havre, Rouen, and Boulogne.‡

These officers also embarked for France on the 9th August, 1914. Major S. L. Cummins accompanied General Headquarters. At the time of mobilization he was Professor of Pathology at the Royal Army Medical College. His duties at General Headquarters were not administrative, but those of medical charge of the officers and other details of the

* Lieut.-Colonel Beveridge was the Professor of Hygiene at the R.A.M. College, Major Forrest was D.A.D.G., A.M.S. in the directorate of military operations at the War Office, and Major Fawcus was commanding the Army School of Sanitation at Aldershot. Their appointments ceased on mobilization. Colonel O'Keeffe had just gone on half-pay after completing his term of appointment as Inspector of Medical Services at the War Office.

† Lieut.-Colonel G. H. Barefoot.

‡ Colonels C. C. Reilly, S. Westcott, and E. H. Lynden-Bell.

G.H.Q. staff. There were also on the staff of the A.D.M.S. of the three sea bases a medical officer for embarkation duties and a sanitary officer, and on the staff of the A.D.M.S. advanced base a sanitary officer. They were not, however, graded then as administrative officers.

An assistant director of medical services with a deputy assistant as his staff officer mobilized with the headquarters of divisional formations as follows :—

Cavalry Division ...	Colonel S. Hickson, A.D.M.S.
	Major E. T. F. Birrell, D.A.D.M.S.
First Division ...	Lieut.-Colonel G. Cree, A.D.M.S.
	Major A. B. Smallman, D.A.D.M.S.
Second Division ...	Colonel H. N. Thompson, A.D.M.S.
	Major F. S. Irvine, D.A.D.M.S.
Third Division ...	Lieut.-Colonel F. W. C. Jones, A.D.M.S.
	Major A. Chopping, D.A.D.M.S.
Fourth Division ...	Colonel C. E. Faunce, A.D.M.S.
	Major H. N. Ensor, D.A.D.M.S.
Fifth Division ...	Colonel R. H. S. Sawyer, A.D.M.S.
	Major J. H. Brunskill, D.A.D.M.S.
Sixth Division ...	Colonel H. O. Trevor, D.M.S.
	Major N. J. C. Rutherford, D.A.D.M.S.

The formation of the divisions into three army corps was not provided for in the 1914 edition of the "Field Service Manual for the Army Medical Service," and consequently no administrative medical appointments were authorized for them in the tables of war establishments at the time of mobilization. But Colonel T. J. O'Donnell from half-pay was appointed a deputy director of medical services on the headquarters of the First Corps, and Colonel R. Porter, also from half-pay, on the headquarters of the Second Corps, each without a staff officer but assisted by the officer in medical charge of the headquarters staff. The Third Corps was not formed until later in France ; and Colonel O'Keeffe, from D.D.M.S., L. of C., was appointed its D.D.M.S., the post of D.D.M.S., L. of C., remaining vacant for some time afterwards.

In the original mobilization scheme for the expeditionary force no provision was made for the appointment of consulting surgeons or physicians to the force, but it was soon recognized that their presence was essential and Lieut.-Colonels G. Makins and Sir Anthony Bowlby, who were officers of the 2nd London and the 1st London T.F. General Hospitals respectively, were sent to France, the former on the 16th September and the latter towards the end of the month as consulting surgeons. Previous to this the directorate of medical services at the War Office was

anxious to send consulting surgeons to work under Surgeon-General Woodhouse, but during August he had telegraphed to say that as there were few seriously wounded coming down, there was no necessity for sending over either Lieut.-Colonel Makins or Lieut.-Colonel Sir A. Bowlby. In a letter, however, dated the 29th August explaining this, he asked that if it was the policy of the War Office to have consulting surgeons, one of these officers should be sent to General Headquarters and the other to the base at Havre. Arrangements were then made for them to go over to France with the temporary rank of colonel.

Subsequently the number of consulting surgeons and physicians appointed not only to the expeditionary force in France but also to expeditionary forces in other theatres of war was greatly increased. Consulting surgeons were appointed to each important base and to each army in the field, and, although the number of consulting physicians was somewhat fewer, they, too, eventually were appointed to armies in the field and to the bases.

The appointment of specialists followed on the appointment of consultants, and by the end of 1914 specialists in operative surgery, bacteriology, and ophthalmology were approved for general and stationary hospitals from among R.A.M.C. officers, under the rank of lieutenant-colonel, who held qualifications in these subjects. These appointments and other special appointments were subsequently extended to other formations, so that eventually there was a complete network of officers in charge of specialist work, with consulting surgeons, physicians and other consulting specialists supervising the work throughout the various expeditionary forces.

Mobilization of medical units for the expeditionary force did not, however, cease on the despatch of the expeditionary force to France in August, 1914. New divisions, new armies and new expeditionary forces were created, for which new medical units had to be mobilized in proportion to their number and strengths. New classes of medical units were also brought into existence. Three new cavalry field ambulances, the 6th, 7th and 8th, were sent to France in 1914, the 6th and 7th being formed of volunteers from various territorial force units. The 8th was the 1/1st Yorks. Mounted Bde. field ambulance of the territorial force. The 9th Cavalry Field Ambulance was formed at the R.A.M.C. depôt and joined the expeditionary force in May, 1915.

The 7th, 8th, 27th, 28th, and 29th Divisions, formed from regular battalions withdrawn from British garrisons overseas and India, with the addition of some battalions in the United Kingdom, were provided entirely with their field medical units

from existing territorial force field ambulances, with the exception of the 21st, 22nd and 23rd Field Ambulances of the 7th division, which were mobilized at Southampton rest camp from R.A.M.C. withdrawn from overseas garrisons. Thus the 1st, 2nd and 3rd Wessex Field Ambulances became the 24th, 25th and 26th Field Ambulances with the 8th Division; the 1st, 2nd and 3rd Home Counties, the 81st, 82nd and 83rd Field Ambulances with the 27th Division ; the 2nd and 3rd London and 2nd Northumbrian, the 84th, 85th and 86th Field Ambulances of the 28th Division, and the 1st West Lancashire, the 1st East Anglian and the 1st Highland, the 87th, 88th and 89th Field Ambulances, which joined the 29th Division in Egypt in March, 1915.

The divisions of the new armies when they mobilized for service overseas were accompanied by three field ambulances each, mobilized, with one or two exceptions,* from the various training centres and depôts of the R.A.M.C. which had been formed to meet the expansion of the corps.

Territorial force divisions went overseas with their own field ambulances, second line field ambulances being formed to replace those first line field ambulances which had been allotted to regular army divisions.†

One clearing hospital, or, as it was subsequently designated, casualty clearing station, was also mobilized for each new division ; but some were taken, as in the case of the field ambulances, from the territorial force, although, on the other hand, some of thecasualty clearing stations formed to accompany trreitorial force divisions were mobilized from R.A.M.C. training centres.‡

In the original scheme of mobilization two stationary and two general hospitals were to mobilize with each division, and so long as these units were organized for 200 and 520 beds respectively new hospitals were formed and proceeded overseas in that proportion ; but as these expanded to units of 400 and 1,040 beds, one stationary and one general hospital only mobilized with the new divisions, while eventually they mobilized irrespective of the number of divisions of the expeditionary

* The 21st Division Field Ambulances, Nos. 63, 64 and 65, were second line territorial force field ambulances of the West Lancashire Division ; and the 97th Field Ambulance of the 30th Division was the 2nd West Lancashire Field Ambulance Territorial Force.

† Second line medical units were, in fact, formed by all the Territorial Force County Associations.

‡ The territorial force clearing hospitals only came into existence in 1913 and were merely a nucleus. Territorial Force County Associations were not, therefore, ready with complete clearing hospital units, as in the case of field ambulances. The West Riding division, however, had a clearing hospital mobilized in August and it went overseas as No. 7 Clearing Hospital.

forces but more in accordance with the requirements of hospital accommodation in each theatre of war.

Territorial force stationary hospitals did not exist and territorial force general hospitals were formed to proceed overseas only when an emergency arose in 1917. Territorial force general hospitals were then organized and went to France from the 1st and 2nd London, 1st Eastern, 2nd Southern, 1st Western, 2nd Scottish, and 1st Northern General Hospitals.* They became the 53rd, 54th, 55th, 56th, 57th, 58th and 59th General Hospitals in France. With these exceptions all the stationary and general hospitals for the expeditionary forces, exclusive of those which mobilized with dominion forces, were mobilized from the R.A.M.C. training centres. Convalescent depôts were also increased in number in proportion to requirements, but most of these were organized out of elements already in the various theatres of war.

Extensive additions were made to the number of sanitary sections. When the armies in France had settled down to stationary warfare the need of sanitary sections in the field to improve the sanitary conditions of towns and villages in which the troops were billeted was realized, and early in 1915 a sanitary section was allotted to each division. They were mobilized and formed chiefly from the London sanitary companies of the territorial force sanitary service.

The proportion of ambulance trains and hospital ships mobilized to meet the increase in the number of divisions did not correspond with the scale laid down for the expeditionary force of six divisions. The number of these units was increased from time to time in accordance with the number of sick and wounded who, it was anticipated, would require transport to the bases and transfer to the United Kingdom in preparation for offensive operations. But when complaints regarding the type of ambulance train provided in the mobilization scheme reached the War Office, the directorate of medical services urged the despatch overseas of six of the ambulance trains which had been constructed in England for use in connection with the distribution of sick and wounded to hospitals in the United Kingdom.† In the meantime the first eleven ambulance trains were formed of rolling stock of the French

* A territorial force general hospital, however, from the 3rd Western, had already gone to India in May, 1916.

†The mobilization scheme provided for the immediate construction of 12 ambulance trains for use on the home railways. They were all ready by the end of August. The proposal to send six of them to France came before the military members meeting of the Army Council on the 19th September, 1914, when the possibility of altering them to suit French railways was considered. The alteration of one of the trains was ordered on the 29th September, 1914, with a view to being sent to France as early as possible.

railways. The trains which eventually mobilized were constructed in England, some of them being generously provided by private donors and voluntary subscriptions.

As regards hospital ships, the three ships mobilized as such with the expeditionary force in August were cross-channel passenger steamers belonging to the Great Western Railway Company. They proved inadequate to meet the requirements of evacuation and more and larger hospital ships were immediately demanded. Thus the "Asturias" mobilized on the 28th August, 1914, and the "Carisbrook Castle" on the 20th September, 1914. They were continually being added to, especially when an Indian contingent joined the expeditionary force in France and expeditionary forces entered theatres of war in the Mediteraranen. Eventually a great fleet of hospital ships was mobilized. Additional advanced and base depôts of medical stores were mobilized partly from personnel and equipment already with the expeditionary force in France and partly from the depôt of medical stores at Woolwich.

The principle of employing mechanical transport with medical units led to the formation of new classes of médical units not contemplated in the original scheme of mobilization. These were the motor ambulance convoys and various descriptions of mobile laboratories. When the expeditionary force sailed for France, the general scheme of ambulance transport for the collection of sick and wounded to the main dressing stations depended on the ambulance wagons of the field ambulances and, for bringing them back to the clearing hospitals and ambulance trains, on the mechanical transport of supply columns returning empty to railheads, supplemented by such local transport as could be requisitioned for the purpose. This scheme broke down from the commencement of operations owing chiefly to the fact that the empty supply column vehicles did not form a unit under the control of the medical services. There was always the risk of conflict between the urgency of getting them back for supplies and their retention by the medical services until they had received and discharged their loads of wounded. The need of mechanical transport under the control of the medical services was also felt at the bases for bringing the sick and wounded from the trains to the hospitals, some of which were being opened at a considerable distance from the detraining stations.

These considerations led to the despatch to France by the War Office of large numbers of motor ambulance cars which were eventually formed into definite R.A.M.C. units as motor ambulance convoys. In a letter dated the 20th August, 1914, the D.M.S. informed the D.G., A.M.S., that he had demanded

60 motor ambulance cars for this purpose. As many as possible of the existing motor ambulance cars belonging to the military authorities in the United Kingdom were then sent to France. Very few existed in the country, but seven of them went overseas between the 22nd and 24th August, 1914. At this time the Wolseley Company had six-cylinder chassis of many cars ready for private purchasers and placed them at the disposal of the War Office, together with many of their employees who specially enlisted in the Army Service Corps as drivers. Ambulance car bodies of a type approved by the War Office were rapidly built on the chassis. Fifty went to France on the 7th September, 1914, and 30 more by the end of the month. These cars were eventually organized as No. 1 Motor Ambulance Convoy. A second convoy was formed shortly afterwards out of a heterogeneous number of cars got together in Paris by the representatives of the British Red Cross Society there. They were eventually replaced by cars with War Office pattern bodies, and became No. 2 Motor Ambulance Convoy. By this time the formation of motor ambulance convoys, in proportion to the number of divisions in the field, had become definitely authorized, and the War Office by the end of 1914 had prepared and despatched as many as 324 motor ambulance cars to France. From them the 3rd and 6th Motor Ambulance Convoys were formed. No. 4 Convoy was formed by cars provided by the British Red Cross Society, and No. 5 by Captain du Cros, M.P., who formed the convoy and took it over at his own expense. These formed the first motor ambulance convoys. Subsequent convoys were made up of motor ambulance cars presented by various generous donors, local committees, and the British Red Cross Society and Order of St. John, as well as of cars purchased by the War Office. Thus No. 7 Motor Ambulance Convoy cars were all presented by the Maharajah of Gwalior ; No. 8 by the Scottish boroughs and counties. By the end of 1915 eighteen motor ambulance convoys had been sent overseas. They became the units for transport of sick and wounded between field ambulances and clearing hospitals, and between clearing hospitals and railheads, those units, in fact, which were foreshadowed as essential in the memorandum submitted by the medical section of the directorate of military operations in 1906.* The total number

* *See* p. 11. Motor ambulance cars also replaced a proportion of horse-drawn wagons in field ambulances for transport of sick and wounded from the advanced to the main dressing station. The 8th Division was the first to mobilize with this change in the transport of its field ambulances. It went to France during the first week of November, 1914. At a meeting of the military members of the Army Council on the 21st October, 1914, it was decided that all future field ambulances and cavalry field ambulances should be equipped on the same scale as for the 8th Division, namely, three horse ambulance wagons and seven motor ambulance cars.

of convoys mobilized before the termination of the war was 48.

Mobile laboratories, fitted on motor chassis, were mobilized from time to time and became definitely organized units in new war establishments. The first of these was a bacteriological laboratory which arrived in France in October, 1914. It was followed by a hygiene laboratory in November of the same year. Subsequently these laboratories were mobilized in the proportion of two bacteriological and one hygiene mobile laboratory for each army in the field. Mobile X-ray laboratories and mobile dental laboratories were also mobilized, the earliest of the former class proceeding to France when trench warfare had been established on the Flanders front, and of the latter in the spring of 1917. Many of these laboratories were presented to the War Office by private donors.

Another new class of medical unit evolved subsequent to mobilization was the ambulance flotilla. The first flotilla was organized on the Seine in 1914, when a flotillawas formed to bring patients from Paris to Rouen. Subsequently four additional flotillas were formed of six barges each, for use on the Calais and Dunkerque system of canals leading to the Flanders front and on the Somme. These were constructed and mobilized in France. Others were prepared in England for work in Mesopotamia.

The number of medical units mobilized in the United Kingdom for expeditionary forces was 235 field ambulances and cavalry field ambulances, 78 casualty clearing stations, 48 motor ambulance convoys, 63 ambulance trains, 4 ambulance flotillas, 38 mobile hygiene and bacteriological laboratories, 15 mobile X-ray units, 6 mobile dental units, 126 sanitary sections, 18 advanced depôts of medical stores, 17 base depôts of medical stores, 41 stationary hospitals, 80 general hospitals, and some convalescent depôts. In addition, several medical units of the Indian Army or Dominion Forces were mobilized as well as hospitals organized for native labour contingents.

The mobilization orders issued on the 4th August, 1914, affected not only the medical services required for the expeditionary force but also for the whole of the organized military resources of the empire. Consequently the mobilization of military hospitals and coast defences at home proceeded according to a pre-arranged scheme. As officers and men of the R.A.M.C. were withdrawn from their peace stations to mobilize with the expeditionary force they were replaced by the home hospital reserve of the St. John Ambulance Brigade and St. Andrew's Ambulance Association. The scheme worked

well, and by the 10th August all members of this reserve had reported for duty at the military hospitals to which they had been allotted. The home hospital reserve of the St. John Ambulance Brigade had then a strength of 2,200 and the home hospital reserve for Scotland of the St. Andrew's Ambulance Association 113. These numbers were greatly increased and 15,871 men of the St. John Ambulance Brigade had been called up and were serving in military hospitals at home by the end of 1915.

The mobilization of the territorial force medical services was carried out with the same expedition as and *pari passu* with the mobilization of the expeditionary force. In one respect their medical units differed from those of the R.A.M.C. in that their field ambulances existed as complete units in time of peace and each of the territorial force fighting units had its own medical officers. The general hospitals, although non-existent in peace, had their permanent cadre establishments of two officers and a quartermaster and a large *à la suite* establishment, from which the required number of medical officers were to be selected on mobilization. The number so selected was restricted to eighteen, which, with the permanent cadre, brought the number mobilized up to the war establishment of a general hospital of 520 beds.

The regimental medical service and field ambulances of the territorial force were in being immediately after the issue of mobilization orders. For mobilization of the general hospitals, plans which had been prepared and approved were adhered to in most cases, but they were expanded or modified subsequently in various ways. All, however, mobilized with great rapidity and were practically ready to receive patients by the end of August, 1914. One, indeed, was ready to receive a limited number of patients as early as the 7th of the month.

Four of these hospitals were opened in London, two in Glasgow, and one each at Cambridge, Brighton, Newcastle, Leeds, Sheffield, Lincoln, Leicester, Aberdeen, Edinburgh, Birmingham, Portsmouth, Oxford, Bristol, Plymouth, Liverpool, Manchester, and Cardiff. These twenty-three territorial force general hospitals of the original mobilization scheme were eventually increased to twenty-five by converting the accommodation set apart in St. Thomas's Hospital for military patients into a 5th General Hospital in London in August, 1915, and by opening a second line general hospital of the 1st Southern General Hospital in Birmingham in May, 1915.

Briefly, therefore, during August, 1914, complete medical services of the expeditionary force mobilized and went to France; the medical services of the territorial force were in

being in the United Kingdom ; and the military hospitals and coast defence medical services at home were provided with personnel from the home hospital reserve of the St. John Ambulance Brigade, the St. Andrew's Ambulance Association, and from the reserve nursing services of the Q.A.I.M.N.S. and Princess Christian's army nursing service reserve.

There were still, however, other organized voluntary aid services, the voluntary aid detachments, ready and eager to mobilize immediately on the outbreak of war. As already described, they were organized by county directors under the Territorial Force County Associations, the majority by the British Red Cross Society, but some by the St. John Ambulance Association and Brigade and a few by the Territorial Force Association of the county concerned. On the 1st August, 1914, there were 543 men's and 1,811 women's detachments with a total personnel of 23,047 men and 47,196 women registered by the War Office. In England, Wales, and the Channel Islands the British Red Cross Society had organized 282 of the men's and 1,225 of the women's detachments, and in Scotland 109 men's and 337 women's ; the St. John Ambulance Association and Brigade had 127 men's and 197 women's detachments in England, Wales, the Channel Islands, and Isle of Man, and the Territorial Force County Association 25 men's and 52 women's detachments in England and Wales. There were at that time no voluntary aid detachments registered from Ireland, although after war had been declared 15 men's and 157 women's were organized there by the St. John Ambulance Association.*

The declaration of war was received by this vast organization of voluntary workers in aid of the sick and wounded with eager enthusiasm. They were anxious to put at once into practice the schemes for which, under their county directors, they had been preparing and training themselves in the days of peace. In some counties their zeal led at first to considerable administrative embarrassment and conflict with the authorities of the Board of Education. Local schools were invaded, school equipment turned out, and the buildings converted into admirably arranged local hospitals long before it was possible or necessary for the military authorities to utilize auxiliary hospitals and before authority to mobilize had been conveyed to county directors. The most useful work carried out by some of the county directors in August, 1914, was the preparation of a general scheme for mobilizing and working their voluntary aid detachments, whenever they were required, and standing fast

* There was a general increase in the number of detachments before the close of the war. Thus on the 1st October, 1919, the totals were 902 men's and 3,015 women's, with a personnel of 41,155 men and 85,391 women.

until then. This was notably so in the county of Northampton, the Territorial Force Association of which submitted to the War Office early in September a scheme for utilizing voluntary aid so excellently thought out and prepared by their county director of voluntary aid detachments that the Army Council expressed their appreciation of it in a letter to the association, stating that, as no place had been taken over or anything disturbed in any way until such time as the various organizations in the scheme would be required, the scheme was the kind of arrangement which was of the greatest value to the Army Council and the Council hoped it would be imitated in other counties.

Throughout this early period of mobilization the Army Council communicated repeatedly with the home commands with a view to restraining the mobilization of the voluntary aid detachments or at any rate preventing them taking over educational buildings until it was essential in the interests of the sick and wounded to do so. The situation, therefore, as regards the mobilization of voluntary aid detachments in August, 1914, was officially one of restraint, but at the same time of encouragement to prepare schemes which should be put into operation whenever the time came for them to be used. The British Red Cross Society had been authorized in Field Service Regulations as the channel through which all other offers of voluntary aid in time of war should be submitted to the War Office. At the beginning of the war, however, the Society's organization and premises were inadequate for dealing with the overwhelming and conflicting mass of offers of assistance which poured into the War Office. Larger premises and a wider organization were eventually obtained to meet the requirements of voluntary aid organization and administrative measures were taken to make the liaison between the Red Cross organization and the military authorities more effective.

CHAPTER IV

ADMINISTRATION OF THE MEDICAL SERVICES

AFTER war was declared an immense amount of new work was thrown on the administrative medical services at home. Administrative measures were urgently demanded for the expansion of hospital accommodation, for the reception and distribution of sick and wounded arriving from overseas and for their final disposal. Special medical arrangements were required for the home forces, for sick and wounded of Dominion and Indian troops, and for those of Allied armies and prisoners of war sent to England. The medical examination of recruits and the recruiting and training of medical personnel for the new armies, the sanitation of overflowing camps and billets, especially in relation to the civil population, the purchase, maintenance and despatch of vast amounts of medical and surgical supplies, the co-ordination and control of voluntary aid and other matters of greater or less importance presented new administrative problems, to meet which practically no provision had been made before war was declared.

The directorate of the Army Medical Service at the War Office consisted at the time of a small staff of officers in the department of the Adjutant-General. Surgeon-General Sir A. T. Sloggett was director-general. He had taken up the appointment from Surgeon-General Sir L. Gubbins as recently as the 1st June, 1914. Surgeon-General W. G. Macpherson was his deputy director-general, having been appointed in March, 1914, in succession to Surgeon-General W. Babtie, who had proceeded to India as director of medical services there in place of Sir Arthur Sloggett. The work of the directorate was carried out in five branches, namely, a branch dealing with personnel and technical training of officers and men of the R.A.M.C.; a branch dealing with questions of sanitation, hospital accommodation, recruiting, statistics and cognate subjects; a branch dealing with questions of hospital equipment, medical and surgical supplies, medical boards, professional matters, and voluntary aid; a branch dealing with organization, mobilization and preparation of the medical services for war; and a section for nursing services. The first branch was in charge of an assistant director-general, Lieut.-Col. C. H. Burtchaell, the nursing section in charge of the matron-

in-chief of the Q.A.I.M.N.S., Miss Becher, and the three other branches in charge of deputy assistant directors-general, Majors H. P. W. Barrow, G. B. Stanistreet, and W. R. Blackwell.

Lieut.-Colonel C. H. Burtchaell was just completing his four years' tenure of the appointment of assistant director-general. Lieut.-Colonel A. P. Blenkinsop had been nominated to replace him, and when war was declared had just arrived from India on completing a tour of service there. He was attached for duty at the War Office on the declaration of war to assist in dealing with questions of expansion of hospital accommodation by private effort. Miss E. H. Becher was assisted by Miss E. M. McCarthy as her principal matron. The latter, however, was mobilized with the expeditionary force and proceeded to France on the 12th August, 1914, as matron-in-chief there, a post which she held until the end of the war. She was not replaced at the War Office until the 19th September, 1914, when Miss E. S. Oram was appointed on her return from acting as principal matron in South Africa.

Major Stanistreet had held his appointment since January, 1913, but Majors Barrow and Blackwell had only joined the directorate in April and May, 1914, respectively. The medical section in the directorates of military operations and training, and the inspectorate of medical services were closed on the declaration of war, as was also the Royal Army Medical College. The territorial force medical service was not represented on the director-general's staff, but there was a matron-in-chief in charge of its nursing service. The periodical meetings of the army medical advisory board and nursing board were in abeyance for the time being.

During the first two months of the war no additions to or changes were made in the directorate, and this comparatively new and small administrative staff carried on the work of the directorate under conditions of severe strain, accentuated by the serious illness of the director-general, which kept him from duty at a critical time during the whole of September and part of October. In his absence his duties devolved on the deputy director-general.

In October, 1914, a change of policy in the administration of the medical services both at home and overseas resulted in the director-general of the Army Medical Service and his deputy director-general proceeding to France. Difficulties had arisen in connection with the desire of voluntary aid organizations and private individuals to take a more prominent part than was permissible in the medical arrangements for the care of the sick and wounded in the field. Large sums of money were being subscribed to the British Red Cross Society and

other organizations, inducing them to seek an outlet for their activities in a manner which would justify more convincingly the appeals for funds that were being made in, and supported by, an influential press.*

Although their spirit and intentions were admirable and worthy of every consideration, some of the proposals were in conflict with military possibilities and requirements, and, in certain instances, involved violations of the Geneva Convention at a time when even a slight infraction of the Convention might be made the excuse for serious reprisals on the part of the enemy. The influences which were at work at the time, however, became more and more insistent, and in order to avoid undesirable complications and friction Lord Kitchener decided to send the director-general to France, not only as director-general of medical services there, but also, with the consent of the British Red Cross Society and Order of St. John of Jerusalem, as Chief Commissioner of the Joint War Committee which these two bodies were then establishing. At the same time, Sir Alfred Keogh, who had been director-general of the Army Medical Service from 1905 to 1910, and was in France as Chief Commissioner of the British Red Cross Society overseas, returned from France at the beginning of October and was appointed to take Sir Arthur Sloggett's place at the War Office.

Sir Arthur Sloggett went to France on the 28th October with Lieut.-Colonel C. H. Burtchaell as his staff officer. Surgeon-General W. G. Macpherson had preceded him on the 17th October, and was succeeded as deputy director-general at the War Office by Colonel M. W. Russell.† Lieut-Colonel A. P.

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* The retreat from Mons, the inadequate ambulance train arrangements, which have already been alluded to, and the sudden change of hospital bases from the Channel to Atlantic ports, with their effect on the general scheme of evacuation of wounded, created the impression that the medical service organization had broken down. Although voluntary aid organizations were far from being in a better position to deal with the situation than the regular army medical service and the responsible military authorities, there was a tendency to create a different impression in the public mind, and an appeal in the *Times* of the 29th August, 1914, was to the effect that " the British Red Cross Society is in urgent need of more funds if effective and immediate aid is to be given to the sick and wounded at the front." The Army Council in consequence of this public announcement found it necessary, in a letter of the 31st August, 1914, to draw the attention of the British Red Cross Society to their advertisement, pointing out that its terms amounted to a suggestion that effective and immediate aid to the sick and wounded at the front was not being provided by the responsible authorities; and that although the suggestion was of course not intended it was clear that misunderstanding on the subject might well arise in the minds of the public. The Army Council accordingly requested the secretary of the society to cause the wording of the announcement to be altered in a manner which would avoid all risk of such a misunderstanding.

† He remained at the War Office as D.D.G. till the 26th December, 1917, when he was placed on the retired list on account of age, and was succeeded by Colonel T. H. J. C. Goodwin.

Blenkinsop took Lieut.-Colonel Burtchaell's place as assistant director-general and handed over his work in connection with voluntary hospitals to Major E. T. Inkson.

The plan of combining the function of chief commissioner of voluntary aid organizations with that of the director-general of medical services of the expeditionary force was a happy solution of the administrative difficulties which were being created. It worked admirably throughout the war. Its success was essentially due to the fact that the regular organization of the army medical service was no longer subject to the conflicting interests and rivalries of the voluntary aid organizations, and that both afterwards worked harmoniously under one control.

After Sir Alfred Keogh had taken over the administration of the medical services at the War Office many additions were made to his staff, partly to assist in the administrative details of special branches of medicine, surgery, and hygiene, and partly in order to deal with the ever-increasing mass of routine work consequent on the opening up of new theatres of war, the expansion of the forces, and the disposal of the sick and wounded. In October, 1914, Colonel C. Beatson, a retired officer of the Indian Medical Service, was attached to the assistant director-general's branch for duty in connection with the establishment of hospitals in England for the Indian contingents then arriving in France, but it was not until a year afterwards that a section in the personnel branch was sanctioned for the territorial force medical services. In October, 1916, an officer was appointed to the personnel branch to assist in obtaining medical men for the army. Other additions to the personnel branch were made in October and December, 1917, when officers were attached to it to assist the assistant director-general and to scrutinize the proceedings of medical boards; and again in March, 1918, when an officer and staff of military clerks were added to the branch in order to deal with card indices of R.A.M.C. officer personnel. In the same year three other officers were attached to deal with man-power statistics. The officer who was appointed to assist the assistant director-general in December, 1917, became an additional deputy assistant director-general in the branch in June, 1918. In January, 1918, Lieut.-Colonel J. P. Helliwell was appointed to represent the dental services in the personnel branch of the director-general's staff, and to advise generally in connection with dental services,which were becoming an important element in the general work of the Army Medical Service both at home and overseas.

Lieut.-Colonel Blenkinsop vacated the appointment of A.D.G.

at the end of February, 1917, on being appointed D.M.S. of the Mesopotamia expeditionary force, and for a time the duties of the branch, until March, 1918, were under the supervision of Surgeon-General Sir W. Babtie, with Lieut.-Colonel Sir E. S. Worthington in actual charge as a D.A.D.G. In March, 1918, Sir E. Worthington was officially appointed A.D.G. As Surgeon-General Sir W. Babtie's appointment at the War Office was that of a D.M.S.—he had been so appointed in March, 1916, on his return from India and Egypt—there was no A.D.G. in the personnel branch between March, 1917, and March, 1918.

Lieut.-Colonel Barrow proceeded to France in June, 1916, and was succeeded by Lieut.-Colonel A. L. A. Webb as D.A.D.G. in the branch dealing with hospital accommodation, sanitation, and statistics. In October, 1914, an officer was attached for duty as an assistant to the D.A.D.G. in this branch, and in January, 1915, Mr. T. R. Walrond was lent to the War Office by the Board of Education to succeed Major Inkson in dealing with accommodation for hospitals. Owing to his intimate knowledge of educational requirements he was of great assistance to the director-general in connection with the acquisition of educational buildings for hospital purposes. In July, 1915, another officer was appointed to it in connection with the maintenance of statistics of sick and wounded and of statistics generally. In April of 1917 Lieut.-Colonel Webb was graded as an A.D.G., and obtained several further additions to the staff of the branch. Amongst others, a D.A.D.G. for sanitation was appointed to the branch in August, 1917, and a separate section was formed to deal with the transfer of sick and wounded officers from hospitals in one command in the United Kingdom to hospitals in another and to auxiliary convalescent hospitals and command depôts, a section which occupied the time of two temporary officers of the R.A.M.C. In March, 1918, another section was opened, which also required the assistance of wo temporary R.A.M.C. officers, to deal with medico-legal questions. Lieut.-Colonel Webb was transferred to the Ministry of Pensions at the beginning of 1919, and was succeeded by Major A. B. Smallman as A.D.G.

Lieut.-Colonel G. B. Stanistreet was appointed A.D.G. on the 28th February, 1917, but continued in charge of the medical and surgical supply branch until March, 1918, when he was appointed D.D.G. Colonel J. R. McMunn succeeded him as A.D.G. on the 1st March, 1918. The additions to this branch during the war were the appointment, in December, 1914, of an officer to assist in medical board and pensions work, being graded eventually as a D.A.D.G. in the branch in

September, 1915. In June, 1915, an officer was added to the branch to deal with the supply of medical and surgical stores and equipment for hospitals, and in August of the same year another officer was appointed to deal with the arrangements for the treatment of cholera. In August, 1917, an officer was appointed in connection with the organization for the supply of spectacles, microscopes, sight-testing appliances, operation room furniture, and various other matters connected with the despatch of medical and surgical stores for shipment overseas, and the branch was further assisted by various technical experts and advisers.

Major Blackwell's branch dealing with organization, mobilization, and preparation of the medical services for war was merged into that of the A.D.G. in charge of personnel, and disappeared as a separate branch on the outbreak of the war. The D.A.D.G. in charge of the branch then became a D.A.D.G. in the personnel branch.

The administration of the nursing services was more centralized than that of the other branches of the director-general's department, as there were no representatives of the matron-in-chief on the staff of the administrative medical services of commands at home, and no machinery existed on the outbreak of war for decentralization of the work. The only addition to the peace staff* in 1914 was that of three additional lady secretaries. With slight additions to the staff, Miss Becher continued to administer the nursing services, with the assistance of a principal matron only, until she broke down in health in June, 1917. She resumed her duties, however, in December, 1917, and was then given a staff of one principal matron, one acting principal matron, one matron, and four lady secretaries, in addition to a comparatively large staff of male and female clerks. During her absence between June and November, 1917, Miss Wilson was appointed to take charge of the nursing section, with Miss G. M. Richards as principal matron.†

In addition to the expansion of the director-general's staff outlined above, consulting specialists, committees and boards were appointed to advise him or the Army Council on technical details connected with the medical services. A standing medical board was appointed at the War Office immediately after war

* The peace staff consisted of the matron-in-chief, a principal matron, one secretary, and two ex-soldier clerks.

† Miss Oram was appointed matron-in-chief of the Egyptian expeditionary force in April, 1915, and was succeeded by Miss Wilson, who, however, left the War Office as principal matron of the Salonika expeditionary force in November, 1915. She was recalled from this post to act as matron-in-chief during Miss Becher's absence. Miss Richards was appointed as an acting principal matron when Miss Wilson was transferred Salonika to.

was declared in order to examine candidates for temporary commissions and as a headquarters medical board. It was composed of officers of the R.A.M.C. who had retired from the service, and was under the presidency of Colonel C. R. Tyrrell. An Army Sanitary Committee was reconstituted in November, 1914, to advise on all matters connected with the health of the army at home and overseas, under the presidency of Brig.-General F. J. Anderson, R.E. Representatives from the Local Government Board and the India Office, together with the military and civil sanitary experts of the Army Medical Advisory Board and certain others, were members of this committee. In December, 1914, Colonel Sir Ronald Ross was appointed to advise the director-general in connection with malaria, and Colonel J. R. Reece for similar duties in connection with cerebro-spinal meningitis. In March, 1916, Sir Robert Jones was appointed to inspect and organize a system of orthopædic treatment of war injuries,* and in November of the same year, Dr. E. N. Burnett was appointed to carry out investigations with a view to economy in the administration of hospitals, especialy in regard to kitchens and hospital diets. His work was of a far-reaching character and proved of immense value at a time when shortage of supplies was becoming serious and the utmost economy essential.

A council of consulting surgeons and physicians, with Major-General Sir B. Moynihan, A.M.S., as president, was appointed to advise on professional and other matters, and committees were formed to deal with such questions as the retention and distribution of medical officers in the United Kingdom; economy in the internal administration of hospitals; cerebro-spinal fever; selection of electro-medical apparatus; the medical aspects of chemical warfare; patterns of surgical instruments, appliances, and medical stores; prevention and treatment of tetanus; prevention and control of dysentery; selection, inspection and testing of X-ray apparatus and training of orderlies in their use; pathological enquiries and pathological work in the army generally.†

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* Assistant inspectors of orthopædics were also appointed in commands, and one of them, Major A. M. Paterson, was attached for duty at the War Office as assistant to Sir Robert Jones.

† The active members of these committees were: Sir B. Moynihan (Medical Officers Committee), Dr. E. N. Burnett (Hospital Economy), Surg.-Colonel J. R. Reece (Cerebro-spinal Meningitis), Capt. W. R. Bristow (Electro-medical), Prof. A. R. Cushny (Chemical Warfare), Colonel F. F. Burghard (Surgical Advisory Committee), Surgeon-General Sir D. Bruce (Tetanus), Colonel Sir W. B. Leishman (Dysentery), Lieut.-Colonel A. D. Reid (Radiology), Surgeon-General Sir D. Bruce (Pathology).

TABLE OF WAR ORGANIZATION FOR ADMINISTRATIVE MEDICAL SERVICES IN THE UNITED KINGDOM UNDER CONTROL OF D.G.A.M.S. AT THE WAR OFFICE AT THE TIME OF THE ARMISTICE AND AFTER.

* *Appointments marked with asterisk existed before the war.*

⊕ *These appointments were not made until 1919:-*

The Administrative Medical Services shewn in double lines belong to Commands outside the War Office.

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In March, 1918, Sir Alfred Keogh retired from the post of director-general at the War Office. He was replaced by Lieut.-General Sir T. H. J. C. Goodwin, and in the following month the Army Medical Advisory Board was re-constituted.

When the Women's Army Auxiliary Corps was formed, the administration of its medical service came under the control of the director-general, and for this purpose an auxiliary section was formed at the War Office in November, 1917. It was placed under the charge of a medical controller.* She was represented by a medical controller at G.H.Q. overseas and by an area medical controller at the headquarters of commands at home and in areas overseas, in addition to subordinate administrative medical controllers and administrators for recruiting and for the medical charge of women.

The administration of the medical service in the commands at home became complicated and difficult chiefly on account of the vast increase in hospital accommodation and the numerous varieties of hospitals which were established with their different methods of administration and heterogeneous personnel. The variety and number of medical boards and regulations for the disposal of sick and wounded and the pressing needs of sanitary work and supervision of camps and billets also added greatly to the difficulties of administration in the various commands. The staff of the D.D.M.S. of a command, however, was not increased officially during the war, but additional officers were attached for duty in his office as required; and the D.D.M.S. was still further assisted by consulting surgeons and physicians, inspecting dental officers, inspectors of hospitals, medical controllers Q.M.A.A.C., specialist sanitary officers, and mental and other specialists; forming a considerable staff as compared with his peace establishment, which consisted only of one specialist sanitary officer and an attached officer.

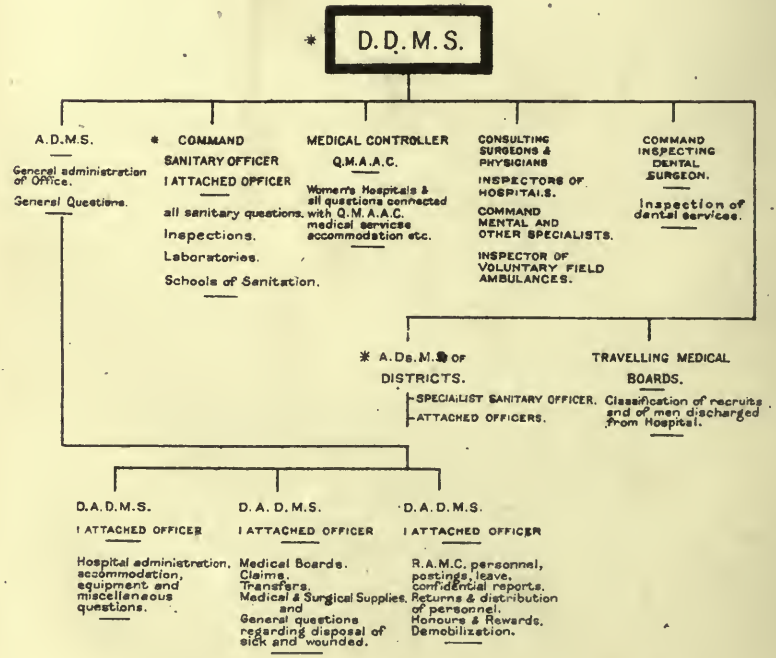
Further, while the Eastern, Southern, and Irish Commands had before the war certain districts under the administrative medical charge of an A.D.M.S. who was subordinate to the D.D.M.S., new districts were formed to meet war requirements, especially in those commands where none previously existed. In this way seven new districts were formed in the Northern, two in the Scottish, and four in the Western Command, while in the Southern and in the Eastern Commands the original three and four expanded to eight and six respectively at one time. The Irish Command retained its original three districts. The expansion of administrative districts was gradual, and had not reached its full limit until demobilization had set in. The distribution of administrative medical services in commands

* Dr. J. H. Turnbull, Q.M.A.A.C.

was then as follows, those marked with an asterisk being original districts:—

Aldershot.	D.D.M.S. and Headquarters Staff.
	*A.D.M.S. Bordon.
	A.D.M.S. Bramshott.
	A.D.M.S. Witley.
London.	D.D.M.S. and Headquarters Staff.
Eastern.	D.D.M.S. and Headquarters Staff.
	*A.D.M.S. Dover.
	*A.D.M.S. Woolwich.
	*A.D.M.S. Chatham.
	*A.D.M.S. Colchester.
	A.D.M.S. Bedford.
	A.D.M.S. Sussex.
Irish.	D.D.M.S. and Headquarters Staff.
	*A.D.M.S. Dublin.
	*A.D.M.S. Belfast.
	*A.D.M.S. Cork.
Northern.	D.D.M.S. and Headquarters Staff.
	A.D.M.S. Tyne.
	A.D.M.S. Catterick.
	A.D.M.S. Ripon.
	A.D.M.S. Humber.
	A.D.M.S. Cannock Chase.
	A.D.M.S. 69th Division.
	A.D.M.S. Grantham.
Scottish.	D.D.M.S. and Headquarters Staff
	A.D.M.S. Eastern (Perth).
	A.D.M.S. Western (Glasgow).
Southern.	D.D.M.S. and Headquarters Staff.
	*A.D.M.S. Portsmouth.
	*A.D.M.S. Tidworth.
	*A.D.M.S. Devonport.
	A.D.M.S. Birmingham.
	A.D.M.S. Bristol.
	A.D.M.S. Netley and Southampton.
	A.D.M.S. Oxford.
	A.D.M.S. Dorset (Weymouth).
Western.	D.D.M.S. and Headquarters Staff.
	A.D.M.S. Preston.
	A.D.M.S. Manchester.
	A.D.M.S. Shrewsbury.
	A.D.M.S. Cardiff.

TABLE OF WAR ORGANIZATION OF ADMINISTRATIVE MEDICAL SERVICES IN A COMMAND AT HOME.


* D.D.M.S.
A.D.M.S.
General administration of Office.
General Questions.
* COMMAND SANITARY OFFICER
I ATTACHED OFFICER
all sanitary questions.
Inspections.
Laboratories.
Schools of Sanitation.
MEDICAL CONTROLLER
Q.M.A.A.C.
Women's Hospitals & all questions connected with Q.M.A.A.C. medical services accommodation etc.
CONSULTING SURGEONS & PHYSICIANS
INSPECTORS OF HOSPITALS.
COMMAND MENTAL AND OTHER SPECIALISTS.
INSPECTOR OF VOLUNTARY FIELD AMBULANCES.
COMMAND INSPECTING DENTAL SURGEON.
Inspection of dental services.
* A.Ds.M.S. OF DISTRICTS.
SPECIALIST SANITARY OFFICER.
ATTACHED OFFICERS.
TRAVELLING MEDICAL BOARDS.
Classification of recruits and of men discharged from Hospital.
D.A.D.M.S.
I ATTACHED OFFICER
Hospital administration, accommodation, equipment and miscellaneous questions.
D.A.D.M.S.
I ATTACHED OFFICER
Medical Boards. Claims. Transfers. Medical & Surgical Supplies. and General questions regarding disposal of sick and wounded.
D.A.D.M.S.
I ATTACHED OFFICER
R.A.M.C. personnel, postings, leave, confidential reports. Returns & distribution of personnel. Honours & Rewards. Demobilization.

* *Appointments marked with an asterisk existed in time of peace - = Travelling Medical Boards were represented in peace by a medical inspector of recruits = The A.D.M.S. on the D.D.M.S. headquarter staff was represented in peace by an attached officer =*
The above scheme did not apply to all Commands, but was modified according to the special administrative requirements of each = It came officially into force after the armistice as a War Establishment.

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The headquarters staff of the D.D.M.S. varied somewhat in different commands, but owing to the continual growth of commands and opening up of new administrative areas it was not until 1919 that an official war establishment regulating the appointments made locally could be issued. The establishment of the office of a D.D.M.S. in a command was then authorized to consist, if necessary, of an A.D.M.S. with three D.A.D.sM.S., a command specialist sanitary officer, four attached officers, an inspecting dental officer, a medical controller of the Q.M.A.A.C., and an inspector of volunteer field ambulances.

On the outbreak of war a Central Force for defensive and offensive operations in the event of invasion was concentrated as an independent command, chiefly within the Eastern Command area. A deputy director of medical services* was appointed to the headquarters of the force in London ; and an A.D.M.S.† to each of the three armies and two mounted divisions of which the force was composed, in addition to the A.D.M.S. of each division of the armies. There was at first no clear definition of the responsibilities of the D.D.M.S. of the Central Force and the D.D.M.S. of commands regarding hospitals in which sick and wounded of the Central Force were treated, and an instruction was consequently issued in October, 1914, limiting the administrative responsibilities of the D.D.M.S. Central Force to the field medical units of divisions, medical personnel of units, and general sanitary supervision of the troops. When sick requiring hospital treatment were transferred from the field medical units to hospitals the responsibility of the D.D.M.S. Central Force ceased with regard to them. The general policy was to relieve the Central Force of responsibility as regards administrative services generally, but to give it every assistance from the administrative services of the command in which its troops were quartered.

When Sir Ian Hamilton gave up the command of the Central Force to proceed to Gallipoli in March, 1915, any complications which may have existed regarding medical administrative responsibility disappeared, as the Central Force then ceased to be a separate command. It became part of the Eastern Command and its entire medical administration was carried out by the D.D.M.S. of that command. A separate command with an administrative medical staff was formed, however, on Sir John French's return from France when he took command of the Home Forces in January, 1916. A director of medical services,

* Surgeon-General J. G. MacNeece.

† Colonels H. M. Sloggett (1st Army), F. J. Jencken (2nd Army), and J. C. Culling (3rd Army).

Surgeon-General Sir T. Galwey, was appointed to his headquarters ; but his responsibilities were confined more or less to the consideration of schemes to meet all possible contingencies in the event of active operations taking place in the United Kingdom, while D.D.sM.S. of commands continued to exercise administrative medical control of hospitals and troops.

Another directorate of medical services, outside the personal staff of the director-general, was the directorate of medical services for the reception and distribution of sick and wounded form overseas, of which an account is given in a separate chapter. The officer in charge of this directorate, Surgeon-General W. Donovan, was graded as a director of medical services for embarkation duties.

The inspectorate of medical services was re-established on the 1st March, 1918. Previous to this, however, a retired officer of the Army Medical Service, Surgeon-General W. S. M. Price, was appointed inspector of hospitals in April, 1915, with the object of bringing to the notice of the officers in charge of hospitals the names of all patients who at the time of his visit were considered fit to be discharged ; and when Surgeon-General Sir W. Babtie, who was nominally D.M.S. India and had been for some time acting as principal director of medical services in the Mediterranean, returned from Egypt in March, 1916, he was appointed a D.M.S. at the War Office with a view to making inspections in the United Kingdom on behalf of the director-general, chiefly in connection with the methods employed by recruiting medical boards in the different commands and by travelling medical boards in weeding out individual men and for hastening the return to duty with their units of men who were temporarily unfit for service in the field. On the 1st March, 1918, he was definitely appointed inspector of medical services with the rank of Lieutenant-General. Major-General Sir M. W. Russell was at the same time appointed an assistant inspector of medical services chiefly with a view to investigating locally the complaints which were continually being sent to the Secretary of State for War, the director-general and other War Office officials from various sources regarding medical services. In fact, an officer, Surgeon-General W. W. Kenny, had been appointed for this purpose to the director-general's staff on the 1st July, 1916, and continued to carry on these duties until he was replaced by Major-General Sir M. W. Russell in the beginning of 1918. At this time also several senior officers who had held administrative appointments in the expeditionary forces overseas had been placed on the retired list on reaching the limit of age, and in order to take advantage of their services they were attached to each command as inspectors of hospitals to assist

the D.D.M.S.* This arrangement continued until October, 1918, when, in order to secure greater uniformity of method, it was arranged that the inspectors of hospitals should, in future, become deputy inspectors of medical services on Lieut.-General Sir W. Babtie's staff, although continuing to reside in the commands to which they were appointed. These appointments were made on the 24th October, 1918, but lapsed on the 1st May, 1919. They established a form of dual control in commands, which met with some criticism chiefly because an inspector in, but independent of, a command tended to centralize in the War Office the work of administration of the command, crippled initiative in the command, and increased correspondence. The object, however, of the appointments was to attain a certain standard of uniformity in and co-ordination of the work of the various travelling medical boards in different commands, and it was understood that the system of War Office deputy inspectors was only to be of a temporary nature.

The administration in the United Kingdom of the medical services of the Dominion Contingents and of United States medical services employed with the British Expeditionary Force in France was kept under separate control at their respective headquarters in London; but they were in close liaison with the director-general. Details of their administration are not available except in the case of the Canadian and South African medical services; but they followed generally the war organization of the director-general's office. An officer of the United States Medical Corps was attached to the directorate of medical services at the War Office when U.S.A. base hospitals were established for British troops in France; and this continued until June, 1919. In the case of Canada, Surgeon-General G. C. Jones became D.M.S. of Canadian Forces at their headquarters in London at the beginning of the war, and was succeeded by Surgeon-General G. la F. Foster in 1917, with the grade of director-general. Surgeon-General Sir W. R. Howse acted in a similar capacity for the Australian Forces. The direction in London of the medical services of the New Zealand and South African Contingents was exercised by D.D.sM.S., Colonel W. H. Parkes being D.D.M.S. at the New Zealand headquarters, and Colonel A. B. Ward at South African Headquarters.

In reviewing generally the administration of the medical services at home during the war, it may be said that both at the

* Officers so appointed were: Major-Generals Sir H. R. Whitehead; Sir C. P. Woodhouse; R. Porter; Sir F. H. Treherne; B. M. Skinner; and Colonels R. J. Geddes and C. W. R. Healy.

War Office and in the commands it had to expand by a process of accretion rather than in accordance with any definite or preconceived plan. The effect—in a way, the defect—of this was apparent in the multitude and variety of Army Council Instructions which were issued or cancelled from day to day, especially in connection with specialization in treatment of diseases and injuries and in the disposal of sick and wounded. The army medical administration, in fact, had many difficulties to contend with during these years in dealing with new experiences and new demands. Towards the end of the war and after, something definite emerged in connection with the administration of such special subjects as hygiene, pathology, and dentistry ; and in providing a better position for and recognition of such subjects as pharmacy and massage. Indeed, the general tendency in army medical administration by the time peace was declared was towards specialist administration of special subjects ; and the influence of this was felt throughout the whole of the medical services in the United Kingdom. It was inevitable that specialism should take a prominent part in the administration of the medical services at home. In the areas of military operations specialism in a professional sense was necessarily surrounded by difficulties and limitations, and it was only in the home hospitals that it could have full play.

CHAPTER V

HOSPITAL ACCOMMODATION IN THE UNITED KINGDOM

BEFORE the war the accommodation in the military hospitals in the United Kingdom was approximately 7,000 equipped beds,* of which some 2,000 were occupied. At the time of the Armistice the number of beds had increased to 364,133, including 18,378 for officers.

This immense expansion of military hospital beds at home was effected in a variety of ways. Additions were made to existing military hospitals, the territorial force general hospitals were opened and enlarged, new military hospitals were constructed or installed in existing buildings, special war hospitals were established in asylums, poor law institutions and other public buildings, civil hospitals allotted beds to military patients, and a large number of auxiliary hospitals was prepared by voluntary effort throughout the country.

From the very commencement of the war the Local Government Board, the Board of Control, the Board of Education, the governing bodies of civil hospitals, the British Red Cross Society, the Order of St. John, the Soldiers' and Sailors' Help Society, municipal bodies, and private individuals co-operated with the Army Medical Service and gave invaluable assistance to it in expanding the hospital accommodation for the sick and wounded from overseas and from camps and garrisons in the United Kingdom.

The number of military hospitals at home before the war was between 150 and 160,† but some of them were more or less obsolete and unequipped. The largest and most important were the Royal Victoria Hospital, Netley, with 955 beds, the Herbert Hospital, Woolwich, with 629 beds, and the Cambridge and Connaught Hospitals, Aldershot, with 492 and 472 beds respectively. Only six others, the Queen Alexandra's Military Hospital in London, King George V Hospital in Dublin, the Alexandra Hospital at Cosham, and the Military Hospitals at Devonport, Colchester, and the Curragh had 200 beds or

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* The actual accommodation in military hospitals was for some 9,000 beds, but a considerable number of the beds was not equipped, and in some cases the accommodation had been appropriated for other purposes.

† If families' hospitals and hospital buildings appropriated for other purposes are added to this number, there would have been over 200 hospitals.

more. Seven other military hospitals had less than that number of beds but more than 100. The majority of the military hospitals were small garrison or depôt hospitals, about 90 of them with only ten beds or less.

Measures were initiated at the War Office for the expansion of these hospitals on the 31st July, 1914, when the commands were asked to report on the extent to which the larger hospitals could increase their accommodation. This was followed by a general instruction, issued on the 10th August, for the opening up of all the military hospitals in the United Kingdom to their fullest extent by the appropriation of such government buildings as were available in the immediate neighbourhood, and resulted in 562 beds being added to the larger hospitals in August, 1,290 in September, 1,342 in October, 1,221 in November, and 814 in December, or a total of 5,229 by the end of 1914. The smaller hospitals were also expanded to a greater or less extent during these months. About half of the additional accommodation was obtained in huts, and the remainder in various buildings or hospital marquees. Altogether the accommodation in the existing military hospitals increased to 26,982 beds during the war. The greatest proportionate increase was in the Western Command from 336 to 1,794 beds, in the Eastern from 1,609 to 7,258, and in the Southern from 2,032 to 8,409. The Western Command before the war had no large military hospitals but had a number of small depôt or garrison hospitals. Other commands doubled or trebled their existing military hospital accommodation.

The twenty-three territorial force general hospitals as already noted were mobilized at once. They were organized for 520 beds, but expanded to an even greater extent than the existing military hospitals by appropriating additional buildings, chiefly schools and poor law premises, in localities often widely apart.* The two new general hospitals (the 2nd line of the 1st Southern General Hospital at Birmingham, and the 5th London General Hospital in St. Thomas's Hospital) which were opened during 1915 added to the accommodation. No limit appears to have been set on the extent to which some territorial force general hospitals could be enlarged, especially in the Western Command, where they became units of an exceptionally extensive character. In the case of the 2nd Western General Hospital, for example, the original 520 beds expanded from one public building to another in the city of Manchester and its

* In some instances sections were opened in towns many miles away from the main section of the hospital. For example, there was a section of the 1st Southern General Hospital at Stourbridge, with the main section of the hospital in Birmingham.

suburbs until at one time, in August, 1917, it consisted of a hospital of 6,700 beds, scattered over 34 different premises, the majority being schools, each with accommodation for 100 to 200 beds or more.

The territorial force general hospitals thus expanded from the normal total of 11,960 beds for which provision had been made before the war to 48,234 beds by the end of 1917. This expansion did not take place as rapidly after mobilization as in the case of the existing military hospitals, but as many as 16,702 beds were ready by the end of 1914.

These territorial force general hospitals were maintained and equipped by Territorial Force County Associations until April, 1917, when the military ordnance authorities in each command became responsible for their equipment and the procedure for maintenance and equipment then became the same as for other military hospitals. The original method of equipping them was by contracts entered into with various local firms during peace, and appears to have worked well and ensured rapid mobilization. But eventually there was much confusion with regard to equipment, especially in the case of those widely expanded hospitals in the Western Command to which reference has already been made.

Most of the territorial force general hospitals opened in educational premises, but some were fortunate in being able to establish themselves in magnificent new hospitals; the 4th London General Hospital, for example, found accommodation in the new King's College Hospital, Denmark Hill, the 1st Western in the new municipal fever hospital at Fazakerly, outside Liverpool. Others, such as the 3rd and 4th Scottish, had new poor law institutions provided for them. The 5th Northern General Hospital opened originally in a large disused asylum, but extended into a fine new poor law hospital, fully equipped, at North Evington, Leicester. When expansion took place, it was usually carried out by taking over other schools, asylums, or poor law premises, and then the necessary works and services were carried out by the authorities to whom the premises belonged.

The following table shows the nature of the accommodation in the various territorial force general hospitals :—

Designation.	Hospital beds in 1917.		Locality.	Buildings, etc.
	Offrs.	O. ranks		
1st Eastern ..	153	1,020	Cambridge ..	Leys Schools and Trinity College Buildings—subsequently hutted hospital.
2nd Eastern ..	45	1,204	Brighton ..	Four Council Schools and three private houses.
1st London ..	231	1,390	Camberwell..	St. Gabriel's College for Ladies, L.C.C. Schools, beds in three civil hospitals (Bart.'s, National Hospital, and London Temperance Hospital), and huts in Myatt's Park.
2nd London ..	170	1,352	Chelsea ..	St. Mark's College, one L.C.C. Secondary School, and beds in four civil hospitals (Central London, Freemasons', Great Northern, St. Andrew's).
3rd London ..	897	1,503	Wandsworth	Royal Victoria Patriotic Schools and huts, with beds in eight civil hospitals (Bolingbroke Hospital, Hospital for Epilepsy and Paralysis, Middlesex Hospital, Royal Hospital, St. Mary's Hospital, Throat Hospital, West End Hospital, Weir Hospital).
4th London ..	478	1,693	Denmark Hill	Part of King's College Hospital; Civil Asylum, Maudsley; beds in Italian, Poplar and West London Hospitals; huts and marquees in Ruskin Park; two L.C.C. Schools, one private house.
5th London ..	62	600	Lambeth ..	Part of St. Thomas's Hospital and huts, and in Red Cross Hospital.
1st Northern ..	113	2,053	Newcastle ..	Armstrong College of Science, private house, and Newcastle-on-Tyne Workhouse Infirmary.
2nd Northern	64	1,720	Leeds ..	Leeds Educational College, and Beckett's Park, Leeds.

Accommodation in the various Territorial Force General Hospitals—cont.

Designation.	Hospital beds in 1917.		Locality.	Buildings, etc.
	Offrs.	O. ranks		
3rd Northern..	58	2,230	Sheffield ..	Collegiate Hall Training College, Collegiate School, six schools, three infirmaries, three civil hospitals (Royal, Oakbrook, Ranmoor), one private house.
4th Northern..	36	1,364	Lincoln ..	The Lincoln School and hutments in the playing fields.
5th Northern..	110	2,527	Leicester ..	Old County Mental Hospital, extended by huts, and North Evington War Hospital (Poor Law Institution).
1st Scottish ..	34	1,385	Aberdeen ..	Four City of Aberdeen School Board's Schools (Girls' High, Central, Rosemount, Westfield), and Poorhouse with added huts and tentage.
2nd Scottish ..	30	1,002	Edinburgh ..	Craigleith Poorhouse.
3rd Scottish ..	—	1,163	Glasgow ..	Glasgow Parish Hospital, Stobhill.
4th Scottish ..	—	1,180	Glasgow ..	Glasgow Parish Hospital, Stobhill.
1st Southern ..	68	3,464	Birmingham.	Birmingham University, two school premises (King's Heath and Stirchley), part of Monyhull Colony for Epileptics, Stourbridge Infirmary.
2nd/1st Southern	—	1,800	Birmingham	Dudley Road Infirmary and billets.
2nd Southern..	200	1,742	Bristol ..	Poor Law Infirmary (King Edward VII wing), Redmaids Secondary School, Poor Law Institution, Southmead, and private house (Bishop's Knoll).
3rd Southern..	262	1,351	Oxford ..	Examination Schools and Annexe and Masonic Buildings, two civil hospitals (Radcliffe Infirmary and Oxford Eye Hospital), Town Hall, College Shelter, three College Buildings (Durham, Radcliffe, Somerville Ladies' College), and Cowley Workhouse.

Accommodation in the various Territorial Force General Hospitals—cont.

Designation.	Hospital beds in 1917.		Locality.	Buildings, etc.
	Offrs.	O. ranks		
4th Southern	193	1,248	Plymouth ..	Poor Law Buildings, three schools (Camel's Head, Hyde Park, Salisbury Road), Civil Hospital (S. Devon and E. Cornwall), private house, and Mutley Barracks.
5th Southern	38	1,108	Portsmouth	Municipal secondary school, Poor Law Infirmary, and section of civil Hospital (Royal Infirmary).
1st Western ..	120	3,396	Liverpool ..	Civil Hospital, 11 schools, Tropical School of Medicine, Wallasey Town Hall.
2nd Western ..	433	4,409	Manchester..	Municipal Central School, 22 school premises, Town Hall, Poor Law Infirmary, and subsequently, in 1918, twelve hundred beds under canvas in the University Athletic Grounds.
3rd Western ..	39	2,496	Cardiff ..	Five school premises, two partly used civil hospitals. (Bedford House and King Edward VII), two L.G.B. premises and cavalry Barracks.

In October, 1914, hutted camps were being constructed for the New Army troops at Witley and Bramshot in the Aldershot Command, at Shorncliffe, Seaford and Harwich in the Eastern Command, at Cromarty and Invergordon in the Scottish Command, at Berehaven in Ireland, and in the Wylye Valley, near Salisbury, in the Southern Command. Hutted camps were subsequently formed at other training centres in the United Kingdom. At first no provision was made for fully equipped hospitals in these camps. Only small detention hospitals, usually in one or more hospital marquees, were provided, and sick requiring hospital treatment had to be transferred to the nearest military, territorial force, or civil hospital. In some cases the hospital was at a considerable distance from the camp. For example, sick from the training centre at Tring were transferred to one of the London territorial force general hospitals, a distance of over 30 miles. Hutted hospitals were afterwards constructed in connection

with hutted camps on a scale of beds that was comparatively small in proportion to the number of troops for which provision was being made. No definite scale appears to have been laid down, but it apparently varied from 1 to 2½ per cent. of the strength; so that in the larger camps such as those in the Salisbury Plain area, hospitals of considerable size were constructed and many of them were eventually expanded by tentage. But several new military hospitals were opened in various other localities to meet local requirements, more especially the requirements of coast defences and smaller garrisons. These new military hospitals, including the hutted hospitals in new hutted camps, added approximately 47,500 beds to the hospital accommodation in the United Kingdom. The following table indicates the distribution and accommodation in the hutted hospitals:—

Command.	Hospital beds.		Designation.	Nature of buildings, etc.
	Offrs.	O.ranks		
Aldershot ..	—	688	Bramshot Military Hospital.	Huts—Canadians.
	—	700	Wokingham Convalescent Hospital.	Canadian Convalescent Hospital.
	—	450	Frensham Hill Military Hospital.	Huts.
Eastern ..	—	120	Princess Christian Military Hospital, Englefield Green.	Hutted Hospital.
	—	140	Sandwich Military Hospital.	Huts and Depôt of R.E. Inland Waterway and Docks Department.
	—	107	Thetford Military Hospital.	New Hutted Hospital.
	—	750	Warlingham Military Hospital.	Hutted Hospital.
Northern ..	—	1,000	Brocton Camp P/w Hospital.	Camp huts.
	26	724	Rugeley Camp Military Hospital.	Hutted Hospital.
	25	645	Catterick Military Hospital.	Hutted Hospital.
	18	338	Clipstone Camp Military Hospital.	Hutted Hospital.
	13	607	Grantham Military Hospital.	Hutted Hospital.
	18	754	Lichfield Central Hospital.	Camp huts near barracks.
	25	645	Ripon Military Hospital.	Hutted Hospital.
Scottish ..	20	206	Cromarty Military Hospital.	Hutted Hospital.

Distribution and Accommodation in Hutted Hospitals—cont.

Command.	Hospital beds.		Designation.	Nature of buildings, etc.
	Offrs.	O. ranks		
Southern ..	11	1,261	Sutton Veny Military Hospital.	Hutted Hospital.
	—	119	Swanage Military Hospital.	Hutted Hospital.
	—	1,040	Canadian Red Cross Hospital, Taplow.	Hutted Hospital.
	20	165	Wareham Military Hospital.	Hutted Hospital.
	—	105	Hazeley Down Military Hospital, Winchester.	Hutted Hospital.
	—	357	Hursley Park Military Hospital, Winchester.	Hutted Hospital.
	10	238	Magdalene Camp Mili- Hospital, Winchester.	Hutted Hospital.
	20	268	Bovington Camp Military Hospital, Wool.	Hutted Hospital.
	—	99	Blandford Military Hospital.	Hutted Hospital in camp.
	24	1,120	Chiseldon Camp Military Hospital.	Hutted Hospital and camp huts.
	100	1,189	Brockenhurst Military Hospital.	Hutted Hospital for Indians and New Zealanders, with some hotels added.
	10	980	Codford Military Hospital.	Hutted Hospital for New Zealanders.
	—	1,265	Eastleigh Military Hospital.	Hutted Camp and school buildings.
	11	1,379	Fargo Military Hospital.	Hutted Hospital and tentage.
	21	588	Fovant Military Hospital.	Hutted Hospital.
Western ..	—	50	Bettisfield Park Military Hospital.	Hutted camp hospital
	—	1,290	Kimnel Park Military Hospital, Rhyl.	530 beds Hutted Hospital extended by canvas.
	—	3,116	Oswestry Military Hospital.	Hutted Hospital for 400. Camp huts. Additional ward huts and canvas for p/w.
	—	730	Prees Heath Military Hospital, Shropshire.	409 beds Hutted Hospital and camp huts.

Another and important class of hospital was the class designated "war hospitals." The term was originally intended for hospitals which were being opened in asylums belonging to the Board of Control under certain agreements with the War Office, but soon others, opened in poor law infirmaries or other buildings by local committees, were also designated war hospitals, though not strictly such. Many of these institutions

were offered by the Government departments concerned immediately after war was declared, the general conditions of the agreement being that the War Office should meet the cost of adaptation, repairs, reinstatements, compensation to displaced staff, rates, taxes, fuel and lighting, and expenditure incurred in moving inmates elsewhere or in additional cost for their maintenance ; also that the superintendent of the institution should be granted a temporary commission in the R.A.M.C. and take command of and administer the hospital, and that the asylum or infirmary staff should be retained for such duties in the hospital as they were accustomed to perform in their civil capacity. The staff was, however, supplemented by R.A.M.C. and military nursing personnel as required, and a regular R.A.M.C. officer was usually appointed for duty as registrar and as general assistant to the administrator for the purpose of maintaining records and discipline. This was the general principle governing the staff of war hospitals, but in some cases a regular R.A.M.C. officer or retired officer of the Army or Indian Medical Service was placed in command. The arrangements worked satisfactorily in most cases, notwithstanding the fact that the asylum officers in charge were without experience of military hospital administration and were obliged to carry out duties with which they were unfamiliar. It was this method of expanding hospital accommodation on which most reliance was placed in the later stages of the war. It was continued until demobilization set in ; more and more institutions being taken up as the war went on and increase of accommodation became urgent. Asylums and poor law institutions were vacated by concentrating the inmates into a smaller number of asylums and institutions, or by boarding them out. Several municipal committees organized war hospitals, on somewhat similar conditions, in poor law premises or municipal buildings, but in some localities, such as Bath and Huddersfield, municipal committees constructed hutted hospitals as local war hospitals. By the end of 1917, the war hospitals provided approximately 53,500 beds. The number increased to some 58,000 by the end of the war.

Asylums and poor law infirmaries, especially those constructed in more recent times, proved ideal buildings for war hospital purposes, as not only had they ample and attractive pleasure grounds and gardens, recreation fields, recreation halls and well-equipped stages for concerts and theatricals ; but they were also going concerns with ample stores and kitchens, water, steam, light and electricity supply, and in fact all the resources of large hospital institutions.

Negotiations for taking over asylums were commenced early

in the war ; so that by March, 1915, nine large institutions were being vacated in order to become war hospitals. The use of poor law institutions was less clearly defined at the beginning of the war, because many of them were taken over by territorial force general hospitals either as their original headquarters or for purposes of expansion. It was only at a later stage that they became independent war hospital units. The following two tables show the more important of the hospitals in asylum and poor law premises.

War Hospitals established in Asylums and Metropolitan Asylums Board Fever Hospitals.

Designation.	Hospital beds.		Government Department.	Locality.	Institution.
	Offrs.	O. ranks.			
Crowthorne War Hospital.	—	48	Home Office	Broadmoor	Asylum for criminal insanes —used for mental cases amongst p/w.
Graylingwell War Hospital.	—	1,040	Board of Control.	Chichester ..	Asylum.
Dartford War Hospital.	48	1,034	Metropolitan Asylums Board	Dartford ..	Permanent fever hospital hutments—used as p/w hospital.
Northamptonshire War Hospital.	—	965	Board of Control.	Duston ..	Asylum.
Horton (County of London) War Hospital.	64	2,462	,,	Epsom ..	Asylum.
Manor (County of London) War Hospital	—	1,179	,,	,,	Asylum.
Ewell (County of London) War Hospital.	—	230	,,	,,	Epileptic colony.
County of Middlesex War Hospital.	—	1,520	,,	Napsbury, St. Albans.	County asylum.
Norfolk War Hospital.	20	1,971	,,	Thorpe, Norwich.	County asylum (500 beds added in 1918 in marquees).
Maudsley Neurological Hospital.	—	200	,,	Denmark Hill	Maudsley Memorial Hospital.
Brook War Hospital	24	890	Metropolitan Asylums Board	Woolwich ..	Fever hospital.
Belfast War Hospital.	—	500	Belfast Corporation.	Belfast	Belfast civil asylum.
Richmond War Hospital.	—	32	Dublin ..	Dublin ..	Richmond district asylum, Dublin.
Springfield War Hospital.	—	225	Board of Control.	Wandsworth	Annexe of Middlesex county asylum.
Gateshead War Hospital.	—	437	,,	Stannington	Gateshead borough asylum (opened August, 1918).
Northumberland War Hospital.	33	1,448	,,	Newcastle-on-Tyne.	City lunatic asylum, with tentage and shelters.
Wharncliffe War Hospital.	—	1,894	,,	Sheffield ..	Asylum.
Edinburgh War Hospital.	55	2,571	Board of Control, Scotland.	Bathgate ..	New asylum buildings, Bangour.
Whittingham Military Hospital.	—	700	Board of Control.	Whittingham	Lancashire county asylum (opened April, 1918).
Murthly War Hospital.	—	350	Board of Control, Scotland.	Murthly ..	Asylum building.
Dykebar War Hospital.	—	500	,,	Paisley ..	Asylum.
1st Birmingham War Hospital.	—	1,000	Board of Control.	Rednal, near Birmingham.	Rubeny Hill asylum.
2nd Birmingham War Hospital.	16	911	,,	Northfield, near Birmingham.	Hollymoor asylum.
Beaufort War Hospital	25	1,578	,,	Fishponds, near Bristol.	Asylum.

War Hospitals established in Asylums and Metropolitan Asylums Board Fever Hospitals—cont.

Designation.	Hospital beds.		Government Department.	Locality.	Institution.
	Offrs.	O.ranks.			
Ashhurst War Hospital.	—	580	Board of Control.	Littlemore ..	Oxford County and City asylum.
4th Canadian General Hospital.	—	1,750	,,	Basingstoke	Hampshire 2nd county asylum, Park Prewett.
Maghull Red Cross Hospital.	37	500	,,	Liverpool ..	New asylum and private house.
Lord Derby War Hospital.	—	3,000	,,	Warrington..	Large asylum (Lancashire county, with tentage).
Welsh Metropolitan War Hospital.	45	1,155	,,	Whitchurch, near Cardiff.	Asylum.
Queen Mary's Military Hospital, Whalley.	—	2,110	,,	Whalley ..	New asylum.
Grove Military Hospital, Tooting.	60	940	Metropolitan Asylums Board	Tooting ..	Fever hospital.
Notts County War Hospital.	—	540	Board of Control.	Radcliffe-on-Trent.	Asylum.
U.S.A. Base Hospital No. 33.	—	1,300	,,	Milton ..	Portsmouth borough asylum (opened Aug., 1918).

Hospitals in the more important Poor Law premises, exclusive of those occupied by Territorial Force General Hospitals.

Designation.	Hospital beds.		Government Department.	Locality.	Institution.
	Offrs.	O. ranks.			
Guildford War Hospital.	—	445	Guildford Guardians.	Guildford ..	Poor law institution.
Belmont P/w Hospital.	92	1,175	Metropolitan Asylums Board (Fulham Board of Guardians).	Belmont, Surrey.	Poor law institution.
Bradford War Hospital.	—	1,174	Municipal Committee.	Bradford ..	Poor law infirmary (part occupied), new buildings, schools and city hospital.
Halifax War Hospital.	—	702	Halifax Guardians.	Halifax ..	Two poor law infirmaries (part occupied of one).
Keighley War Hospital.	—	720	Keighley and Bingley Joint Hospital Board, L.G.B.	Keighley ..	New civil fever hospital.
East Leeds War Hospital.	—	1,895	L.G.B. and Education Authorities Local Committee.	East Leeds ..	Two poor law institutions, schools and parochial hall.
Stoke-on-Trent War Hospital.	—	711	L.G.B.	Newcastle-under-Lyme.	Poor law premises.
Bagthorpe War Hospital.	—	2,021	L.G.B. and Education Authorities.	Nottingham	Poor law infirmary, Bagthorpe, and schools.
Sunderland War Hospital.	—	500	Sunderland Guardians.	Sunderland..	Highfield hospital, poor law infirmary with hutted extension.
Dundee War Hospital	6	462	Poor Law ..	Dundee ..	Poor law institution.
Perth War Hospital	—	100	Parish Council	Perth ..	Poor law institution.
Merryflats War Hospital.	—	488	,, ,,	Govan ..	Part of poor law institution.
Oakbank War Hospital.	—	250	,, ,,	Glasgow ..	Poor law institution.
Leith War Hospital..	165	420	,, ,,	Leith ..	Poor law infirmary.
Crookston War Hospital.	—	350	,, ,,	Nitshill ..	Poor law institution.
Reading War Hospital	106	1,573	L.G.B. Educational.	Reading ..	Poor law infirmary, schools, public buildings.
Fusehill War Hospital	—	650	L.G.B. ..	Carlisle ..	Poor law hospital, two schools.
Chester War Hospital	—	650	,,	Chester ..	Poor law infirmary.
Ashton-under-Lyne Lake Hospital.	—	250	,,	Ashton-under-Lyne.	Poor law hospital.
Tranmere Auxiliary Hospital.	—	350	,,	Birkenhead..	Poor law hospital.

Hospitals in the more important Poor Law premises, exclusive of those occupied by Territorial Force General Hospitals—cont.

Designation.	Hospital beds.		Government Department.	Locality.	Institution.
	Offrs.	O. ranks.			
Queens Park Auxiliary Hospital.	—	200	L.G.B. ..	Blackburn ..	Poor law hospital.
Townleys Hospital ..	—	560	,,	Bolton ..	Poor law hospital.
Primrose Bank Hospital.	—	330	,,	Burnley ..	Poor law hospital.
Griffithstown Auxiliary Hospital.	—	301	,,	Griffithstown	Poor law hospital.
Alderhey Hospital ..	32	830	,,	Liverpool ..	New poor law infirmary.
Belmont Road .. Hospital.	—	950	,,	,,	Poor law infirmary, increased to 2,000.
Highfield Hospital ..	—	510	,,	,,	Poor law infirmary.
Mill Road Auxiliary Hospital.	—	700	,,	,,	Poor law infirmary.
Dearnley Hospital ..	—	800	,,	Rochdale ..	Part of poor law hospital.
Hope Hospital ..	—	431	,,	Salford ..	Part of poor law hospital.
Steppinghill Hospital	—	500	,,	Stockport ..	Part of poor law hospital.
Whitecross Auxiliary Hospital.	—	509	,,	Warrington..	Part of poor law hospital.
Berrington War Hospital.	—	520	,,	Shrewsbury	Poor law infirmary.
Kitchener Military Hospital.	76	1,624	,,	Brighton ..	Poor law infirmary.
Edmonton Military Hospital.	—	1,810	,,	Edmonton ..	Poor law infirmary.
Bangor Military Hospital.	—	200	,,	Bangor ..	Poor law infirmary.
Nell Lane Military Hospital.	—	3,284	Manchester Guardians.	West Didsbury.	Poor law hospital.
Richmond Military Hospital.	—	514	L.G.B. ..	Richmond ..	Poor law institution.
Southwark Military Hospital.	—	783	,,	East Dulwich	Poor law infirmary.
Tooting Military Hospital.	—	712	,,	Tooting ..	Poor law institution.
Bermondsey Military Hospital.	—	796	,,	Bermondsey	Poor law workhouse.
Bethnal Green Military Hospital.	—	729	,,	Bethnal Green	Poor law infirmary (with beds in London Hospital).
City of London Military Hospital.	14	713	,,	Lower Clapton.	Poor law infirmary.
Endell Street Military Hospital.	—	573	,,	Endell Street, W.C.	St. Giles infirmary.
Fulham Military Hospital.	—	1,130	,,	Hammersmith	Parish of Fulham infirmary.
Hampstead Military Hospital.	—	788	,,	Hampstead	Mount Vernon hospital, Haverstock Hill hospital, and New End poor law infirmary.
Holborn Military Hospital.	—	954	,,	Mitcham ..	Poor law institution.
Lewisham Military Hospital.	24	838	,,	Lewisham ..	Poor law institution.
Mile End Military Hospital.	—	864	,,	Mile End ..	Poor law institution.
Military Orthopædic Hospital, Shepherds Bush.	30	1,070	,,	Shepherds Bush.	Hammersmith infirmary and workhouse.

The accommodation for military patients in civil hospitals varied very much both in numbers and in importance. In certain cases complete hospitals were placed at the disposal of the military authorities. In others, a definite number of beds was allotted for sick and wounded soldiers in special wards; while in others, again, the number of beds was indefinite and military patients were admitted to the general wards according to

the accommodation available. The War Office had been warned by the experience of the South African War not to place reliance on expanding military hospital accommodation by means of the civil hospitals to any great extent. It was obvious that the needs of the civil population demanded the full use of these hospitals. The experience of the South African War was repeated during the war of 1914-18. At the same time the governing bodies of civil hospitals did everything in their power, compatible with their obligations to the sick and injured of the poorer classes, to assist in providing additional hospital accommodation for military patients. The beds obtained in this way totalled some 16,000 during the war, the majority being available immediately after war was declared. Military patients admitted to civil hospitals were treated and nursed by the hospital staff in the same way as civil patients, the military authorities paying a capitation grant to the hospital of four shillings daily* for each military patient. A number of these civil hospitals, especially in London, were sections of military or territorial force general hospitals for purposes of discipline, maintenance of records and final disposal of their military patients, or they were affiliated to them for administrative control. Practically none of them were independent military units.

Civil isolation hospitals were generally used for military patients suffering from acute infectious diseases, who were admitted under the same conditions as civil patients ; the War Office paying a capitation grant of six shillings daily for each military patient.† Where the accommodation was insufficient the War Office arranged with local sanitary authorities to have additional pavilions or huts constructed on sites adjacent to or in the grounds of the existing hospitals.

A very large proportion of the 364,133 beds obtained during the war was in hospitals established and equipped by voluntary aid organizations and private individuals. Hospitals of this kind were offered in large numbers from the time war was imminent, and in every part of the country. Their variety and character were almost as great as their number. In accordance with the Field Service Regulations all voluntary offers of assistance in aid of the sick and wounded made in the United Kingdom on the outbreak of war or during the progress of hostilities, other than those coming from the ambulance departments of the Order of St. John and the St. Andrew's Ambulance Association

* This rate remained unaltered until February, 1918, when it was raised to four shillings and ninepence.

† In special cases a maximum of seven shillings was allowed.

for the provision of personnel, had to be submitted in the first instance to the British Red Cross Society and communicated by it to the Army Council if they were likely to be of practical value. Numerous offers, however, came to the War Office direct, and much embarrassment was caused in the earlier stages of the war by the refusal of several of the donors to place themselves in the first instance in the hands of the British Red Cross Society to which they were referred by the War Office authorities in accordance with the regulations on the subject. The administrative medical services consequently had to face the dilemma either of refusing important means of expanding hospital accommodation or of ignoring their own regulations. To meet this difficulty in dealing with questions of expansion of hospital accommodation a representative of the British Red Cross Society attended at the War Office for the purpose of consulting the army medical department regarding the suitability of offers of private hospitals.*

Certain voluntary hospitals were offered by influential committees, representing several subscribers or public bodies, with a view to their joining the expeditionary force in France. With regard to hospitals of this kind, the policy of the War Office was to encourage them to establish themselves in suitable localities in England; or to consent to be placed alongside military hospitals at home as a means of expanding the latter, until such time as it was possible for the military authorities in France to accept them for service overseas. Important additions were thus made, especially to the accommodation at the Royal Victoria Hospital, Netley, where the British Red Cross Society and a Welsh committee each constructed excellent hutted hospitals in its grounds.

Throughout the country large and small hospitals, some 1,600 in number and varying from 6 to 200 or more beds, were accepted chiefly through the Joint War Committee of the British Red Cross Society and Order of St. John.† Most of these hospitals were opened and staffed by local voluntary aid detachments; and, although the accommodation in some of them was not large, they were regarded as of immense importance in offering to those who had no other means of doing so the opportunity of helping in the work of the war and of coming into close touch and sympathy with the sick and

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* At first Mr. G. H. Makins represented the British Red Cross Society, and on his joining the expeditionary force as consulting surgeon in September, 1914, Mr. Fox Symons took his place.

† The number of hospitals from which the Joint War Committee obtained returns was 753 in 1915, 960 in 1916, 1,073 in 1917 and 1,014 in 1918. These, however, did not include voluntary hospitals in Scotland.

wounded.* This and other considerations, such as the need of employing civil medical practitioners in their own civil practices, counterbalanced the disadvantages of having hospital accommodation scattered throughout the country in innumerable small hospital units instead of being concentrated in a few large units. In one or two localities, as, for example, at Exeter and Cheltenham, local groups were formed under central administration, thus materially removing some of the defects inherent in having numerous small hospitals administered separately.†

The voluntary hospitals were designated auxiliary hospitals and received, or were entitled to receive, a War Office capitation grant for each military patient admitted to them. The capitation grant varied according to the facilities for treatment. Those with a trained nursing personnel and suitable equipment were designated Class A auxiliary hospitals, and those suitable only for reception of convalescents requiring little or no hospital treatment were designated Class B auxiliary hospitals. In the earlier months of the war this classification did not exist, as the Class B auxiliary hospitals were registered as convalescent homes to which military patients could be discharged from hospital on sick furlough. The term " convalescent home " was abolished in September, 1915, and auxiliary hospitals were then definitely classified as Class A and Class B hospitals.

At first only the auxiliary hospitals which were not established as convalescent homes obtained a capitation grant. A flat rate of two shillings was sanctioned for each patient in them daily from the commencement of the war. This capitation grant was extended to the convalescent home class in March, 1915, but in the following month no further offers of private convalescent homes were accepted. The capitation grant was increased from time to time and additional grants were also sanctioned, so that the State aid to auxiliary hospitals was of a substantial character by the end of the war. As early as November, 1914, the flat rate was increased to three shillings per occupied bed daily, if such increase was considered necessary. In December, 1916, a grant of sixpence was sanctioned for each unoccupied bed, and in December, 1917, the

* One medical officer, in an isolated country town in Wales, wrote in May, 1915, to the director-general emphasizing this point. " We do not wish," he wrote, " to close down, as these small hospitals do a good work in keeping alive the people's interest in the war and we feel that if for no other reason than this, it would be unwise to remove the only object-lesson which an isolated country district like this can possibly have of the existence of our national struggle."

† In March, 1917, an Army Council Instruction required a minimum of 20 beds in new auxiliary hospitals established for officers, and a minimum of 40 beds in those established for other ranks.

maximum rate for occupied beds was increased to three shillings and threepence for Class A auxiliary hospitals and to two shillings and sixpence for Class B.* In June, 1918, a further increase up to three shillings and ninepence per occupied bed was granted to certain Class A hospitals, which were performing the functions of a military hospital and receiving patients direct from overseas.

Further grants from public funds were made to enable the voluntary aid organizations to remunerate doctors who were in medical charge of sick and wounded in auxiliary hospitals. In February, 1918, payment of fourpence daily for each equipped bed was granted for this purpose to those receiving patients direct from overseas, and threepence daily to others; with a limit of payment of seventeen shillings and sixpence daily to any one civil practitioner in the case of the former, and twelve shillings and sixpence daily in the case of the latter; but this grant was disallowed in the case of auxiliary hospitals receiving the maximum capitation grant, or a special grant of seven shillings daily for officer patients. Other financial arrangements were made to assist those auxiliary hospitals which undertook care and treatment of convalescents in billets as out-patients. Although several of the donors of auxiliary hospitals did not accept these capitation grants, and this was specially so in the earlier stages of the war, much financial assistance was given in this manner to the hospitals of voluntary organizations from public funds.† In addition, certain equipment was given by the military authorities on loan to the auxiliary hospitals. The hospital clothing, for example, was so supplied and also War Department marquees for purposes of expanding accommodation; but the employment of officers and men of the R.A.M.C. in them was permitted in very exceptional cases only.

There was at the beginning and for some time afterwards a considerable amount of difficulty and confusion in the administration of auxiliary hospitals and control over the patients in them. A capitation grant on the basis of occupied beds tended to induce those in charge of an auxiliary hospital to retain patients in it who were otherwise fit for discharge or who ought to have been returned to larger hospitals for more

* When convalescent homes became Class B auxiliary hospitals they did not participate in the increase of the flat rate from two to three shillings.

† The published accounts of the cost of auxiliary hospitals show a total expenditure during the four years 1915 to 1918 of £10,556,598 13*s.* 5*d.*, of which a sum of £7,760,727 0*s.* 3*d.* was borne by the War Office. This represents expenditure on 813 auxiliary hospitals in 1915, 982 in 1916, 1,081 in 1917, and 1,020 in 1918. In other words 70 per cent. of the cost was borne by the public. The balance was made up by voluntary subscriptions. The value, however, of the gratuitous personnel services of commandants and staff of auxiliary hospitals, large and small, cannot be estimated financially.

suitable treatment, and consulting surgeons were at times emphatic regarding the unsatisfactory surgical results brought about by retaining patients in auxiliary hospitals unsuited for their treatment. Attention had also to be drawn to lack of discipline in auxiliary hospitals. These difficulties were met at first by the appointment of an inspector of hospitals,* whose duty it was to bring to notice the names of patients who were fit to be discharged; and, later on in the year, auxiliary hospitals were called upon to submit weekly to the military hospitals to which they were affiliated a return showing the names of all patients who had been thirty days or longer in their charge. "Orders for patients in Auxiliary Hospitals" were issued by the War Office in May, 1915, but it was not until January, 1917,† that the respective responsibilities of county directors of voluntary aid organizations and the command military authorities in regard to auxiliary hospitals were clearly defined. County directors were then made responsible for the internal economy of auxiliary hospitals and were recognized as honorary officials of the military command in which their county was situated. They were to keep in close touch with the military administrative medical services in the command, the latter being responsible for seeing that the patients were adequately fed and treated and not retained for an undue length of time.

In so numerous and extensive a variety of auxiliary hospitals wide differences in efficiency and suitability were bound to occur, but the military authorities of all commands pay tribute to the loyal and valuable assistance given to them by the county directors of voluntary aid organizations, without whose co-operation effective military administration of the auxiliary hospitals would have been a task of infinite difficulty if not practically impossible.

The expansion of hospital accommodation in the United Kingdom was greatly increased by the accommodation provided for convalescents; and the history of this is intimately associated with the work undertaken in the earlier months of the war by the Class B auxiliary hospitals. Homes for convalescent soldiers were offered in large numbers throughout the country; and as early as the 31st July, 1914, the secretary of the Soldiers' and Sailors' Help Society,‡ who had done similar work during the South African War, informed the War Office that he was prepared to deal with all offers of convalescent homes, which might be placed at the disposal of the military authorities

* Surgeon-General Price, A.M.S.(R.P.), appointed the 28th April, 1915.

† A.C.I. 53 of January, 1917 modified, in some minor details by A.C.I. 614 of the 31st May, 1918.

‡ Major Tudor Craig.

by private individuals. He was, however, informed at the time that the terms of the Field Service Regulations required all such offers, as already mentioned, to be submitted through the British Red Cross Society. He had in the meantime commenced registering and classifying the offers which were reaching the Soldiers' and Sailors' Help Society. By the end of August, 1914, he had offers of accommodation for 8,273 convalescents in homes where the donors were prepared to pay all expenses of maintenance; for 4,299 in homes where donors asked for a contribution towards the expenses of feeding patients; and for 6,150 in unoccupied houses on which expenditure was necessary before they could be used. On these facts being represented, the offer of the Soldiers' and Sailors' Help Society to find suitable homes for convalescent soldiers on sick furlough was accepted by the War Office on the 28th August, 1914. Major Tudor Craig's organization then became known officially as the Central Convalescent Home Registry. The object of the Central Registry was to place convalescents in homes near their own friends when discharged to sick furlough. Forms were prepared and distributed to all hospitals for use in submitting an application for placing a convalescent; and the Central Convalescent Home Registry on receipt of the application made arrangements for the reception of the convalescent into a home in the locality to which he wished to go. A vast amount of work was undertaken by Major Tudor Craig in organizing this system, and classifying the very numerous offers of homes. By the 9th September, 1914, he had on his register accommodation for 17,954, including 3,573 officers, in homes where the donors paid all expenses. The War Office drew up and issued rules for observance by the sick and wounded admitted to them, similar to rules which had been issued by the Admiralty for naval convalescents who were also being received into private houses.

Although every assistance was given by the War Office and commands at home to enable convalescents to take full advantage of this organization, the system of central control had to be abandoned by the end of October, 1914, partly because there was a certain number of patients whom it was undesirable to send to private convalescent homes, partly because only a limited number were anxious to go on sick furlough to them and preferred to go to their own homes, but chiefly because of the difficulty in controlling the movements of men on sick furlough and getting them back to their units. In order, therefore, to utilize more fully the accommodation in convalescent homes the central registry system was abandoned in November, 1914, and, instead, the deputy directors of medical

services in each command were made responsible for keeping a register of the private convalescent homes available in the command, for transferring patients from hospitals under their control to them, and for the subsequent return of such patients to their units. Convalescent homes thus became merged eventually into the class of auxiliary hospitals, and in September, 1915, as already mentioned, the term convalescent home was abolished and the original convalescent homes designated "Auxiliary Hospitals, Class B." Convalescent officers, however, continued until the end of the war to be placed in convalescent homes through a central organization of officers' convalescent homes at the War Office, similar to Major Tudor Craig's Central Convalescent Home system.

So long as accommodation was thus available for convalescents, the Army Council's scheme* for establishing convalescent depôts on mobilization in barracks at Lichfield, Winchester, Shorncliffe, and Warley was in abeyance, although the question had been raised on the 24th August and again on the 10th September, 1914. In any case, all the barrack accommodation in the country was then required for recruits.

The system of granting convalescents sick furlough to convalescent homes involved bringing them back to the military hospitals for final discharge after expiry of their sick furlough; so that much of the advantage of using convalescent homes for keeping beds vacant in the military hospitals was lost. In many cases, too, officers commanding hospitals displayed some hesitancy in sending patients on sick furlough in consequence of the difficulty and responsibility involved in supervising them and getting them back again. It was also found impossible in auxiliary hospitals and private convalescent homes to carry out the measures necessary to make convalescents rapidly fit for duty overseas. These and other considerations, especially the urgent need of easing the pressure on the hospital accommodation in the United Kingdom, made it necessary early in 1915 to establish organized military convalescent hospitals on a large scale. The earliest was opened at Eastbourne on the 8th April, 1915, with accommodation for 3,840 convalescents. Four others were opened in the same year; at Dartford for 1,200 in May, at Epsom for 4,000 in June, at Alnwick for 2,080 in August, and at Blackpool for 4,600 in October. With the exception of a small but useful convalescent hospital for 460 beds in the barracks at Holywood, which was opened in January, 1916, no other military convalescent hospitals were opened until 1917, when three others were opened; for 1,820

* *See* Chapter I, p. 19.

convalescents at Ashton-in-Makerfield in April, for 872 at Woldingham in July, and for 4,560 at Plymouth in August.

The following table shows the accommodation in and date of opening of these and other convalescent hospitals in the United Kingdom.

Name of Hospital.	Maximum number of beds.	Date of opening.
Military Convalescent Hospital, Eastbourne	3,840	8/4/15
Orchard Military Convalescent Hospital, Dartford* ..	1,200	24/5/15
Military Convalescent Hospital, Woodcote Park, Epsom†	4,000	24/6/15
Military Convalescent Hospital, Alnwick.‡	2,080	22/8/15
Kings Lancashire Military Convalescent Hospital, Blackpool	4,600§	1/10/15
Military Convalescent Hospital, Holywood ‖	460	15/1/16
Military Convalescent Hospital, Ashton-in-Makerfield	1,820	14/4/17
Military Convalescent Hospital, Woldingham.. ..	872	21/7/17
Military Convalescent Hospital, Derriford Camp, Plymouth	4,560	/8/17
Military Convalescent Hospital, Randalstown ..	497	1/10/18

But in addition to those shown in this table convalescent hospitals were opened for Canadian and other Dominion troops in various places; and a special convalescent hospital for men who had recovered from dysentery was opened at Barton-on-Sea in April, 1916.¶

A large number of hospitals, chiefly auxiliary hospitals, was maintained for convalescent officers. Reference has already been made to the fact that the system of maintaining convalescent homes for officers through a central registry was continued when the system was abolished for other ranks. Accommodation for convalescent officers continued to be provided by numerous small auxiliary hospitals throughout the country, with the exception of 1,545 beds in the Military Convalescent Hospital at Blackpool, and 200 to 264 beds in Officers' Military Convalescent Hospitals at Moffat, Eaton Hall, Chester, Bournemouth, Harrogate, and Brighton. In August, 1918, the total number of beds for convalescent officers was 5,376

* Handed over to the Australian military authorities, August, 1916.

† Handed over to the Canadian military authorities, August, 1916, but continued to receive Imperial troops for some time afterwards.

‡ Converted into a Command Depôt, October, 1916.

§ Includes 1,545 beds for officers.

‖ Transferred to Randalstown, October, 1916.

¶ It was designated Dysentery Convalescent Depôt, when it was opened, but the name was changed to Dysentery Convalescent Hospital in September, 1916. It had previously been a depôt for sick and wounded of the Indian Contingent, when fit for discharge from hospital, having been opened for this purpose in November, 1914.

distributed amongst 82 different hospitals, the majority being hospitals with some 20 to 40 beds each. As many as thirty-one were in the Southern Command, fifteen were in the Western, fourteen in the Eastern, seven each in the London and Scottish Commands, and four each in the Northern Command and Ireland.

Finally, hospital accommodation was greatly relieved by the formation of the units known as Command Depôts. Strictly speaking these were not medical units, but they performed functions similar to those of the military convalescent hospitals. They were established originally towards the end of 1915 owing to the large and increasing number of soldiers invalided from the expeditionary forces, who, for a considerable time, were unfit to be included in reinforcement drafts and required special arrangements for their administration and medical treatment. They were the class of men who would otherwise have drifted into auxiliary hospitals or would have been retained for lengthened periods in the reserve units and regimental depôts, occupying accommodation required for home garrisons and drafts. Instructions were consequently issued in October, 1915, for the formation in each command of depôts to which men requiring special treatment on discharge from hospital, such as was not obtainable in the reserve or regimental depôts, were to be sent if not likely to be fit for service overseas within three months. The medical treatment in these Command Depôts was that of graduated exercises, including massage and therapeutic gymnastics, the ultimate object being to harden invalids sufficiently to enable them to join their reserve battalions within six months in a condition fit for drafting overseas. In April, 1918, twenty Command Depôts* with a total accommodation for 75,500 had been established. This accommodation, however, is not included in the statement of hospital accommodation, although it was an important factor in providing accommodation for men who might otherwise have filled convalescent hospitals, auxiliary hospitals, and small depôt hospitals.

There was one hospital, which was not a military hospital, a convalescent hospital, or a command depôt, but performed functions of all three at one time or another, and was therefore in a somewhat anomalous position, namely,

* Enteric convalescents were not treated in convalescent hospitals, but in special enteric depôts, which were regarded for administrative purposes as command depôts. In this respect enteric convalescents were treated differently from dysentery convalescents, for whom a convalescent hospital was provided. The reason for this distinction being made is not clear. The object in each was the same ; namely, to keep dysentery and enteric convalescents out of command or reserve depôts until they were proved to be no longer carriers of disease germs.

the Casualty Clearing Station established at Eastleigh, near Southampton. This was a medical unit, opened in April, 1915, with the object of receiving direct from hospital ships such cases as in civil hospitals would be out-patients and who consequently did not require special accommodation in ambulance trains for conveyance to other hospitals. Patients were there sifted out and sent to other hospitals by ordinary passenger trains or discharged as fit for duty after two or three weeks' stay in the unit. It was established at first in a school and small drill hall, and expanded into a larger drill hall, a railway institute, and several small Armstrong huts. The accommodation was thus increased from 220 beds in July, 1915, to 1,280 in March, 1917. When it was first established it was called a Clearing Hospital, but this name was changed to that of the Military Hospital, Eastleigh, in April, 1917, when it carried on the functions of continuous hospital treatment for slighter cases of wounds and sickness. This designation was again changed in January, 1918, to "Casualty Clearing Station, Eastleigh," and its previous function of receiving and treating slight cases from overseas, who would be fit for discharge in fourteen days, restored. After that period of treatment, patients, if still unfit, were to be transferred without delay to suitable hospitals.*

In the general accommodation for sick and wounded in hospitals in the United Kingdom accommodation for special classes of wounds or sickness became more and more a prominent feature as the war went on, and many of the new hospitals as well as sections in the territorial force general hospitals and larger military hospitals were allotted for special cases only. At the beginning of the war special provision had to be made for acute mental cases. Later on special hospitals for the treatment of neurological patients were opened, and special beds assigned in each command for epileptics. Other conditions for which special hospitals or special beds were assigned were venereal diseases, cardiac conditions, rheumatic affections, malaria, dysentery, enteric group of diseases and affections caused by poison gas. Special orthopædic hospitals, subsequently designated special military surgical hospitals, hospitals or sections of hospitals for treatment of fractures of the femur, for wounds of the jaw and face, for wounds of the head, for eye injuries, and for the limbless were also established. These occupied a considerable proportion of the total accommodation

* A similar unit was opened at Canterbury when Dover became a large disembarkation centre, but, owing to the unsuitability of the camp, it was closed after being in existence for a short time only.

available, more especially those set apart for the neurological, orthopædic, and venereal class of patient.

The Canadian, Australian, New Zealand, and South African Medical Services established hospitals, convalescent hospitals and special hospitals in the United Kingdom, and hospitals were also established for Indians at Brighton, Bournemouth and Brockenhurst when the Indian troops were in France. Many of these hospitals were taken over from hospitals already established for the Expeditionary Force. When the United States of America entered the war, their medical services also took over British hospitals, and at the time of the Armistice in November, 1918, had established or were establishing large new hospitals in the neighbourhood of Liverpool, Winchester, Netley, Portsmouth, and Devonport.

In addition to the methods detailed above for expanding hospital accommodation in the United Kingdom after war was declared certain other expedients were adopted for use in emergencies. Thus in November, 1915, the floor space in in hutted hospitals was reduced from 80 to 60 superficial feet per bed and the number of beds permitted in a single ward increased to 50. Further, arrangements were made by which patients who could look after themselves were put into billets and treated as out-patients. Hospitals, in other words, were permitted to have billeting sections. This arrangement did not prove very satisfactory and was abandoned whenever it became possible to do so.

It is somewhat difficult to obtain an accurate analysis of the proportion of beds obtained in each of the various classes of hospital established during the war, as there were constant fluctuations in the accommodation. But it is possible to analyse approximately some 317,000 beds which was a more or less constant hospital accommodation between the autumn of 1917 and the beginning of 1918.* The result of this analysis is shown in the following table. The special Red Cross Hospitals shown in the table refer to the two hospitals established at Netley, a special hospital for neurological cases in Liverpool, and two large hospitals at Glasgow established by the Scottish Branch of the Red Cross Society.

* In 1918 a considerable and steady increase in hospital accommodation up to the time of the Armistice set in, and previous to August, 1917, a similar gradual increase had been going on since the beginning of the war. *See* Chart.

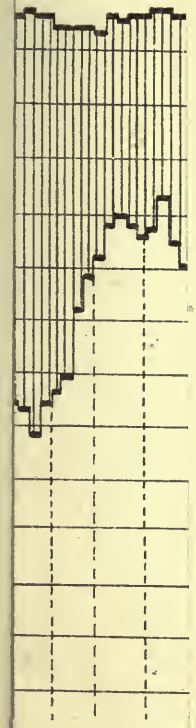
Table showing analysis of the Hospital Accommodation in August, 1917.

Class of Hospital.	Number of beds.	Percentage of beds to total beds.
Permanent Military Hospitals	26,982	8·6
T.F. General Hospitals	48,234	15·2
New Military Hospitals	47,455	15·0
War Hospitals (Asylums and Poor Law Institutions, etc.)	53,536	16·9
Civil Hospitals	18,134	5·7
Convalescent Hospitals	14,198	4·5
Canadian Hospitals	11,615	3·7
Australian Hospitals	3,941	1·2
New Zealand Hospitals	4,166	1·3
South African Hospitals	619	·2
Prisoners of War Hospitals	3,397	1·0
Auxiliary Hospitals	81,505	25·7
Special Red Cross Hospitals	3,293	1·0
Total beds ..	317,075	100·0

An analysis of the total beds equipped in the different commands at the time of the Armistice is shown in the following table :—

Equipped Beds in the United Kingdom for week ending 15th November, 1918.

Command.	Officers.	Other ranks.	Total.
Aldershot	153	8,270	8,423
Eastern	2,427	82,228	84,655
Irish	356	7,445	7,801
London	5,884	30,780	36,664
Northern	1,597	53,615	55,212
Scottish	1,112	23,179	24,291
Southern	3,861	67,218	71,079
Western	3,612	72,018	75,630
Channel Islands	36	342	378
	19,038	345,095	364,133



Owing to the constant fluctuations in the beds allotted for special diseases or wounds no adequate analysis has been made; but on the 31st March, 1919, the following equipped beds were in existence for certain special cases :—

Special Beds equipped 31st March, 1919.

Class.	Total beds equipped, including beds for Officers.	Officers only.
Malaria	2,660	—
Mental	4,200	70
Neurological	9,350	270
Dysentery	4,680	70
Prisoners of War	8,500	240
Venereal	8,620	580
Orthopædic	18,540	890
	56,550	2,120

On the same date a classification which is shown in the following table was made of the number of beds in certain classes of building :—

Nature of building.	Total beds equipped, including beds for Officers.
Civil Hospitals	16,000
Schools	26,853
Board of Control Premises	20,906
Huts	43,830
Poor Law Premises	55,573
	163,162

Auxiliary hospitals may be considered as excluded from the analysis shown in these two tables.

The chart shows graphically the increase in hospital accommodation in the United Kingdom from time to time and the number of beds occupied and vacant.

CHAPTER VI

THE RECEPTION, DISTRIBUTION AND DISPOSAL OF SICK AND WOUNDED IN THE UNITED KINGDOM

A SCHEME for the reception and distribution of sick and wounded was prepared immediately war was declared, and after it had been fully considered on the 12th August, 1914, at a War Office conference of all branches concerned, including the finance branch, it was issued to commands at home and to voluntary aid organizations on the 25th August in the form of "Preliminary instructions for the reception and distribution of sick and wounded from overseas." The scheme was based on an arrangement made on the outbreak of war by which all sick and wounded from overseas would disembark at Southampton and be distributed from there. Its general principle consisted in the larger military and territorial force general hospitals receiving the sick and wounded direct from the port of disembarkation, and for vacant beds being maintained for fresh arrivals by transferring patients to the civil hospitals, to the smaller military hospitals, and to the private or auxiliary hospitals according to the nature of treatment which each of these hospitals was in a position to carry out; as well as by discharging on sick furlough to their own homes or to private convalescent homes patients who were no longer in need of hospital treatment, and invaliding from military service those who were permanently unfit. In order to give effect to this principle the hospitals receiving patients direct from the port of disembarkation were called central hospitals, and those hospitals to which patients were transferred were affiliated to them for purposes of military discipline, maintenance of records, general supervision, and disposal of the sick and wounded. Each central hospital thus formed the centre of a group of affiliated auxiliary hospitals.

These preliminary arrangements were subject to modification as time went on*; and as additional large military

* In communicating the instructions to commands, the Army Council clearly indicated that they were not to be regarded as hard and fast rules, but only as principles upon which the distribution of sick and wounded should be carried out.

hospitals were established, these, too, became central hospitals with a certain number of affiliated hospitals allotted to each. In some commands the general principle was modified to meet the ever-increasing number of hospitals and the expansion of their accommodation ; so that in them the affiliated hospitals were eventually either civil hospitals allotting a certain number of beds to military patients, or auxiliary hospitals of Class A or B provided by voluntary aid organizations, while other hospitals, such as the new military hospitals and war hospitals, became themselves central hospitals of a group of auxiliary hospitals.

The number of hospitals affiliated to a central hospital was regulated so far as possible in order to secure a more or less uniform proportion of beds to the beds in the central hospital. The modifications, however, which were made in this respect in the different commands did not follow on similar lines. While the Aldershot, London, Eastern and Southern Commands followed the general principle, the Irish and Scottish Commands included amongst their affiliated hospitals a considerable number of units which in other commands would have been classed as central hospitals. The Western Command showed the greatest divergence from the general principle. In this command not only auxiliary, civil, and poor law institution hospitals, several with accommodation ranging from 400 to 800 beds, but large new military hospitals, such as the Prees Heath Camp Hospital with 600 beds, the Kimnel Park Military Hospital with 890 beds, the Oswestry Camp Hospital with 866 beds, and special hospitals, such as the Alder Hey Hospital with 830 beds and the Belmont Road Hospital, Liverpool, with 950, were regarded as affiliated to a central hospital instead of becoming themselves the central hospital of a group. No definite policy appears to have existed for classifying new hospitals as central hospitals, according to their size, nature, or importance, or for determining the proportion of beds in a central hospital to those in its affiliated group. Consequently there is the spectacle in the Western Command of the 1st Western Territorial Force General Hospital, with accommodation in 1917 for 3,000, having hospitals affiliated to it with a total accommodation for 10,000 ; while the 2nd Western General Hospital, with accommodation for some 5,000, had accommodation for over 17,000 affiliated to it. No doubt much of this diversity in the application of the general principle was due to the modification of the preliminary instructions being left to the discretion of the individual commands.

In February, 1916, the attention of commands was drawn

by an Army Council Instruction to the distribution of military patients between military and auxiliary hospitals, pointing out that, while it would be uneconomical to leave military hospitals, the maintenance of which was a direct charge against public funds, empty or nearly so in order to fill auxiliary hospitals to which capitation grants for occupied beds were given, civil and private auxiliary hospitals could not be expected to continue indefinitely to reserve beds and maintain establishments if they received no patients in respect of whom grants were payable. It was left to the discretion of commands, therefore, to allot a fair proportion of patients to the auxiliary hospitals, the larger share going to those receiving a lesser capitation grant, in order to relieve the public as much as possible of the cost of the higher capitation grants. Whatever may be said in favour of the methods adopted in the Western Command, the need of definite instructions regarding the proportion of affiliated beds to central hospital beds was much felt, if for no other reason than the desirability of maintaining an equable number of occupied beds in the hospitals whose finances depended on capitation grants. Central hospitals with a proportion of three affiliated beds to one central hospital bed were much less likely to be in a position to keep the auxiliary beds filled with suitable cases than central hospitals with a smaller proportion of affiliated beds.

Instructions of the 12th October, 1914, and of the 11th November, 1915, gave the D.D.M.S. of a command authority to select suitable private and civil hospitals for the reception of patients direct from the port of disembarkation. This was construed as an authority for certain of the Class A auxiliary hospitals to receive patients direct, although they continued to be affiliated to a central hospital. Some of them were well equipped, staffed, and situated, but this was not invariably the case, and local influences were often brought to bear on a D.D.M.S. to grant the authority to unsuitable hospitals. To become a primary auxiliary hospital, as such hospitals were designated, was a coveted distinction. The arrangement, however, by which certain auxiliary hospitals received sick and wounded direct facilitated distribution from the ports of disembarkation, as double transfers by rail were avoided, especially when the auxiliary hospitals concerned were at some distance from a central hospital.

The scheme for the reception and distribution of patients was based then upon this grouping of affiliated hospitals with central hospitals, and a special administrative appointment was created to control the arrangements. Surgeon-General W. Donovan, who had retired from the Army Medical Service a few years previously, undertook the duties of the appoint-

ment. He was graded at the beginning of the war as a deputy director of medical services for embarkation duties.* In April, 1917, his grade was raised to that of a director of medical services. He directed the reception and distribution of sick and wounded from Southampton until his office was transferred to London in September, 1917.

There was already an embarkation medical officer on the permanent peace establishment of the Southampton embarkation staff, with a small detachment of the R.A.M.C. and a medical store in charge of a quartermaster of the R.A.M.C They formed the nucleus of the larger administrative organization which was improvized after war was declared. Major Anderson, the embarkation medical officer,† and Major Wilson, the quartermaster in charge of stores, continued to carry on their duties under Surgeon-General Donovan, and Major Henderson was added to the establishment as staff officer.‡

This embarkation directorate subsequently assumed wide administrative responsibilities. New ports of disembarkation were opened as reception and distributing centres for sick and wounded, and the control and supervision of the personnel and equipment of ambulance trains in the United Kingdom and of hospital ships based on cross channel and Mediterranean ports were added to its duties.

Dover was opened as a disembarkation port in January, 1915, and a distributing centre formed at the new station of the South Eastern and Chatham Railway there. A portion of the Southampton disembarkation staff was sent to it under Major Ellery, R.A.M.C., as D.A.D.M.S. Embarkation. It had a strength at first of 40, but, as the volume of the work at Dover increased, between 200 and 300 officers and other ranks of the R.A.M.C. were employed on reception and distribution duties there.§ The control of distribution, however, was centralized at all times in the office of the D.M.S. Embarkation.

An attempt was made, in 1915, to establish a disembarkation centre at Portland with a view to relieving congestion

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* The term " for embarkation duties " was the official designation before the war for medical services connected with embarkation and disembarkation of troops ; and the term was not altered, although it did not indicate the main function of this medical staff during the war.

† He was graded as an A.D.M.S. Embarkation in September, 1915. He was succeeded in June, 1916, by Lieut.-Colonel H. M. Nicholls.

‡ He was succeeded in November, 1914, by Major Leslie, graded as a D.A.D.M.S. Embarkation in April, 1916.

§ Both at Southampton and Dover, during periods when large numbers of sick and wounded were arriving, much assistance was obtained by local voluntary aid detachments, who acted as stretcher bearers, and also in 1916 at Southampton by naval detachments from H.M.S. " Hermione."

at Southampton, more especially for ships carrying Indian sick and wounded. The port proved unsuitable, and was soon abandoned. No R.A.M.C. personnel was allotted as an embarkation staff, but an arrangement was made for 20 to 30 men of a local voluntary aid detachment to attend each disembarkation on a grant to each of four shillings daily for his out-of-pocket expenses. This proved an economical and efficient arrangement.

The next port intended for disembarkation of sick and wounded was Avonmouth. It was opened for reception of patients arriving in hospital ships from the Mediterranean and other distant ports. An embarking medical officer, subsequently graded in March, 1918, as a D.A.D.M.S. Embarkation, with one N.C.O. and two men were appointed as embarkation medical staff, a local voluntary aid detachment providing the necessary stretcher bearers on similar terms to those in force at Portland.

Hospital ships arrived from time to time at Devonport, and similar arrangements were made for establishing a reception and distributing centre there, Lieut.-Colonel Gibbons, I M.S., with a small R.A.M.C. personnel, being appointed D.A.D.M.S. Embarkation, and graded as such in October, 1917.

Liverpool, London, and Glasgow were occasionally used as ports of disembarkation, and also had a D.A.D.M.S. Embarkation appointed for purposes of administration at each. Other ports used were Tilbury, Boston, Hull, Leith, Folkestone, and Newcastle.†

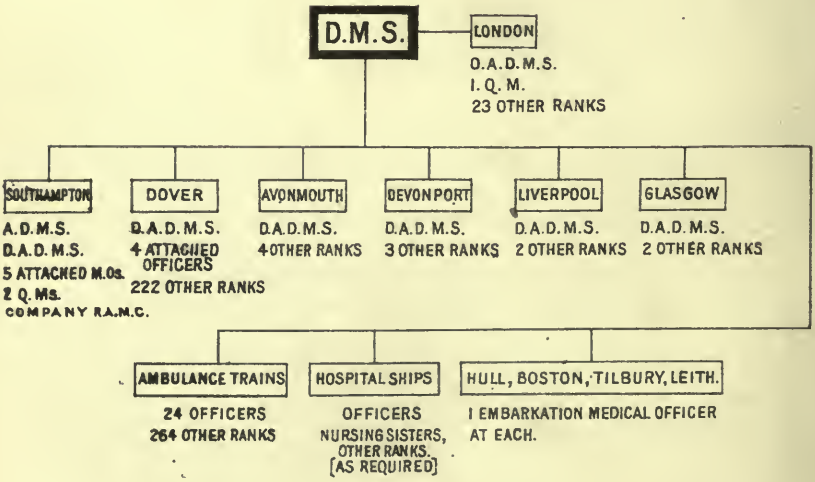
Liverpool and Tilbury were used for disembarkation of invalids from the Far East, and Leith for hospital ships from North Russia. Boston and Hull were used for reception of sick and wounded repatriated prisoners of war. At none of these ports was it necessary to maintain a R.A.M.C. staff for disembarkation duties. The local voluntary aid detachments or personnel detailed from local hospitals provided stretcher bearers, when these were required; but an embarking medical officer and clerical staff were appointed, under the direct control of the D.M.S. Embarkation, to each port to which no D.A.D.M.S. Embarkation had been allotted.

The total number of sick and wounded disembarked and distributed from all these ports between the 28th August, 1914, and the 31st July, 1919, was 129,675 officers and 2,525,350

† The two last named were not recognized as regular ports of disembarkation of sick and wounded.

MEDICAL EMBARKATION STAFF

AS CONSTITUTED FOR HOME SERVICE.



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Malby & Sons. Lith.

other ranks* ; the number received at each port being as follows :—

Southampton	59,710	*Officers.*	1,257,928	*other Ranks.*
Dover	67,008	,,	1,226,337	,,
Avonmouth	1,628	,,	21,258	,,
Devonport	636	,,	7,572	,,
Liverpool	34	,,	1,594	,,
Folkestone	—	,,	1,840	,,
Newcastle	15	,,	93	,,
Boston	349	,,	3,726	,,
Leith	252	,,	4,196	,,
London Docks	19	,,	121	,,
Hull	24	,,	685	,,

It will be seen that the bulk of the work of reception and distribution took place at Southampton and Dover.

The R.A.M.C. personnel employed bythe medical embarkation staff had their headquarters in Southampton Docks and were formed into a separate company of the R.A.M.C.—No. 48 —in August, 1918.† The detachment at Dover was orginally obtained from No. 11 Company at Canterbury, but it became merged into No. 48 Company when the latter was formed. The strength of the Company varied from 300 upwards, and in addition to performing clerical and bearer duties at the reception and distributing centres, supplied detachments for the ambulance trains and replaced casualties in hospital ships. The directorate was demobilized in July, 1919, but its D.A.D.M.S.§ was then retained at the War Office on the Director-General's staff as a section of the branch dealing with hospital accommodation and statistics. He continued in this capacity to administer the reception and distribution of sick and wounded, ambulance trains and hospitals.

The successful working of the improvized medical administration for the reception and distribution of sick and wounded was only possible by the co-operation and support of the Directorate of Movements at the War Office, the Transport

* In addition to these numbers 243 Belgian officers and 9,100 Belgian soldiers ; 1,517 officers and 44,682 other ranks, enemy prisoners of war ; and 881 officers and 19,791 other ranks, British repatriated prisoners of war, were received.

Many more Belgian sick and wounded were received and distributed in England at the beginning of the war, but came in ships not under the control of the Directorate of Medical Services, Embarkation.

† The R.A.M.C. Company at Southampton Docks was known as Port No. 1 Company, R.A.M.C., some time before it was formed into No. 48 Company.

§ Major Shires, who succeeded Major Leslie in June, 1918.

Department of the Admiralty and their representatives at the different ports with whom the director of medical services embarkation and his staff were in constant touch.

Sick and wounded on disembarkation at a reception and distribution centre were formed into convoys and entrained for conveyance by rail to the various central or primary auxiliary hospitals throughout the country. In order to organize suitable convoys each hospital authorized to receive patients direct from the port of disembarkation was required to inform the D.M.S. Embarkation by telegram twice weekly, and subsequently daily, of the number of vacant beds available in it.

There were many difficulties and complications during the course of the war in arranging the convoys. At first efforts were made to send patients to hospitals in the neighbourhood of their own homes, but this only met with partial success. It was seldom possible to arrange a complete train-load of wounded whose homes were in the same locality; or it might happen that the number of beds vacant in the hospitals there was insufficient. Apathy on the part of the patients themselves was also responsible for difficulties in suitable distribution, for, in spite of every encouragement, many men seemed unwilling to apply for any special destination or delayed doing so until it was impossible to comply with their request.

Then came the complications which arose when the system of allocating cases for special hospitals at home was introduced under the influence of specialist administration. The number of special classes of cases which arrived on ships labelled for special destinations or requiring special consideration in forming the convoys exceeded twenty at one time, not including those belonging to the Dominion Forces or special branches of the service. These special cases included officers suffering from neurasthenia and other special diseases; medical and surgical neurological cases amongst other ranks; injuries to the skull; heart cases; orthopædic cases; patients under Carrel-Dakin treatment; jaw injuries and those requiring plastic operations; nephritis and early nephritis cases; chest wounds; ophthalmic patients; cases of total blindness; enteric, dysentery, and mental patients; carriers of infective diseases, labelled according to the disease; wounds of arteries; burns; wounds of the bowel or rectum; wounds involving fractures of the femur; and cases for discharge as permanently unfit. In addition to these special cases, sick and wounded would arrive labelled for a Royal Air Force officers' hospital at Hampstead, or as prisoners of war, nursing sisters, members of St. John Ambulance Voluntary Aid Detachments,

members of British Red Cross Society Voluntary Aid Detachments; Australian, Canadian, New Zealand, Newfoundland, South African and Indian Contingents; Americans, Belgians, or other Allies; all intended for special distribution.

Until 1918 a separate label was attached to each class of case, and the multitude of labels became a source of confusion and error. This was remedied by attaching a gummed red label with a white centre to the envelope containing the field medical card, which each patient carried attached to his coat in some conspicuous position, the class of case for distribution being marked on the white centre of the label.

A patient not coming within any of the above categories was labelled with a number showing the section of the United Kingdom to which he selected to go. For this purpose the D.M.S. Embarkation divided the country into five hospital sections as follows:—

Section I.—London and South Eastern, including the hospitals at Woolwich, Chatham, Southend, Brighton, Shorncliffe, Broadstairs, and Aldershot.

Section II.—South Western, with hospitals at Devonport, Plymouth, Torquay, Exeter, Weymouth, Bournemouth, Netley, Portsmouth, Bristol, and Cardiff.

Section III.—Midlands, with hospitals at Birmingham, Nottingham, Bedford, Cambridge, Ipswich, Colchester, Bury St. Edmunds, Norwich, Leicester, Northampton, and Derby.

Section IV.—Northern, with hospitals at Leeds, Lincoln, Liverpool, Manchester, Newcastle, Sheffield, and York.

Section V.—Scotland.

This geographical distribution was arbitrary and did not correspond with the geographical areas of commands in the United Kingdom.

At one time the distribution of sick and wounded to Ireland was provided for specially outside the control of the D.M.S. Embarkation, patients belonging to Ireland being as a rule embarked at the overseas ports in ships sailing to Dublin direct. In these cases the arrangements for their reception and distribution came under the administration of the D.D.M.S., Irish Command. Only in a very few instances was advantage taken of this arrangement. As a rule invalids for Ireland were disembarked at Southampton or Dover, conveyed by ambulance train to Holyhead, and embarked in a hospital ship there, under the control of the D.M.S. Embarkation. This method of transferring patients to Ireland, however, did not work well and was abandoned. Arrangements were then made for concentrating Irish sick and wounded in hospitals in the South of England,

and, when a sufficient number had accumulated, they were embarked in a hospital ship at Southampton or Liverpool and conveyed thence to Dublin.

The task of distributing a convoy of sick and wounded from the reception centre, as may well be imagined from this list of requirements, was complicated and difficult; but it was well managed by Surgeon-General Donovan and his staff.

Mention has already been made of the twelve ambulance trains which were mobilized in August, 1914, for use on the home railways.* Prior to the declaration of war there was only one military ambulance train in the country. It was constructed for distribution of sick and wounded arriving in England during the South AfricanWar and consisted of five coaches, each carrying 12 cot and 6 sitting cases, or 20 sitting cases. After the South African War it was garaged at Netley and used for conveyance of invalids, arriving from stations abroad, to Netley and Woolwich. The coaches proved very useful for supplementing the new ambulance trains, and for attaching to ordinary passenger trains when only small numbers of sick and wounded had to be distributed. The construction of the twelve new trains was ordered on the 5th August, 1914. The Great Eastern, Lancashire and Yorkshire, London and North Western, London and South Western Railway Companies prepared one each; and the Midland, Great Western, and Great Central two each.† Two trains were prepared by the Great Northern and Great Southern and Western Railways of Ireland for use in Ireland.

It was originally estimated that it would take six weeks to prepare these ambulance trains, and when the orders were issued for their construction it was suggested that voluntary aid detachments should prepare improvized ambulance trains for immediate use pending the preparation of the permanent trains. The first of the ambulance trains, however, arrived at Southampton Docks on the 24th August, and the others by the end of the month, in ample time for the distribution of the first ship-loads of wounded from France. In the meantime two trains were improvized locally by voluntary workers in the Scottish Command. They were made up of goods vans with swinging cots; one being stationed at Aberdeen and the other, provided mainly at the expense of Mr. Whitaker, the chairman of the North British Railway, at Edinburgh. The former was scarcely ever used, and the latter was employed chiefly in connection with naval medical services.

Each ambulance train was designed to consist of ten eight-

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* *See* footnote to p. 51, Chapter III.

† The total cost of the trains was £23,984 3*s.* 9*d.*

wheeled coaches, five of them being wards for 20 patients each, and the others a kitchen car, a pharmacy car with bath and operating room, and three cars for the staff and stores. Later this design was modified by replacing one of the cars for the staff by an additional ward coach, making a total capacity for 120 cot cases. It was found possible to do so by limiting the number of stores carried. Eventually, eight more ambulance trains of similar construction were added for use on the home railways. The twenty ambulance trains, thus available, were still further supplemented by two or more emergency vans being attached as required to each. These emergency vans were vestibule bogie vans each equipped with ten stretchers on the floor and ten in tier over them on special trestles. The carrying capacity of a train could thus be increased, if necessary, from 120 to 200 lying down cases. A number of passenger corridor coaches was also always available to attach to the ambulance trains for sitting cases. Thus an ambulance train might have attached to it, for example, one vestibule van and three corridor coaches giving a total capacity of 140 lying down and 150 sitting up. There was, however, no limit to the number of corridor coaches, provided the weight and length of the train met the requirements of the railway authorities.

Two other permanent trains were formed by combining six of the vestibule vans, and attaching to them a kitchen car and three passenger coaches. They carried 120 lying down cases each, and, although not so comfortable as the ambulance trains, they proved useful and more economical than the ordinary passenger trains which had to be used previously in emergency for lying down cases. For sick and wounded able to walk and suitable for conveyance sitting up emergency trains consisting of passenger corridor coaches with a kitchen coach attached were also held in readiness at Southampton and Dover. They carried 300 to 500 patients each.

The largest amount of accommodation available for distribution of sick and wounded by rail in the United Kingdom was reached in the early part of 1918. There were then 20 ambulance trains, 2 vestibule van trains, 6 war department coaches, and 30 vestibule vans, with 2,400, 240, 72, and 600 cots respectively, or a total accommodation for 3,312 patients lying down, while for sitting up cases there were 10 emergency trains carrying a total of 3,000, and 48 coaches carrying 2,100. There was thus in one journey of the trains a total carrying capacity of 8,412, which could and was increased in emergencies by some of the trains making more than one journey in a day.. By this means it was possible to distribute to hospitals from the

ports of disembarkation the maximum number of sick and wounded arriving on any one day. This maximum was reached on the 6th July, 1916, when 10,112* patients were distributed from Southampton and Dover to various hospitals in the United Kingdom. During the week 3rd to 9th July of that year, 47,582 sick and wounded had arrived at these ports, and 121,160 during the month. This was the period of the severest strain on the work of reception and distribution during the war.

During periods of great congestion of sick and wounded and because of the necessity of keeping a large margin of beds vacant in hospitals overseas for future emergencies, many serious cases of recently wounded men arrived at the ports of disembarkation in the early days of the war. Such cases were all sent to Netley or London, but the gradual filling of available accommodation in the hospitals there made it imperative to provide accommodation for serious cases at more distant hospitals. In order that such cases and their fitness to travel should receive special consideration before being entrained, officers in charge of hospital ships were ordered to attach plain red labels† to all patients whom they considered serious cases. The possibility of sending serious cases long distances by ambulance train gave rise to much criticism at first and caused anxiety to those responsible for determining their destination. Experience proved, however, that long railway journeys in these trains did not have any prejudicial effect in the great majority of cases. In fact, the anticipation of going to a hospital near their own homes had a mental effect on patients which proved in many cases most beneficial. Secondary hæmorrhage was the chief danger to be feared. A large proportion of the cases in which hæmorrhage occurred were not to all outward appearance serious. Complete arrangements, however, existed on the ambulance trains for dealing with such accidents, and only two deaths are recorded on the ambulance trains amongst the first 500,000 patients and six during the whole war out of over 2,600,000 patients distributed.

On the destination of a convoy being determined a preliminary telegram was sent by the embarkation medical staff to the hospital concerned ; and on the departure of the train, the time of departure and particulars of the special cases and numbers entrained were communicated by telephone or telegram. On longer journeys further particulars were sent by telegram from

* 7,902 from Southampton, and 2,210 from Dover. See also Appendix D, Tables I and II.

† This was before the red label with the white centre was introduced. It was also used subsequent to the introduction of the latter.

intermediate halting places. The responsibility for reception of the convoy on reaching its destination then rested with the officer in charge of the hospital, who was thus kept sufficiently warned as to the probable time of arrival and the nature of the cases for which provision had to be made.

An economical feature in the running of the ambulance trains was introduced by sending convoys from Southampton or Dover to hospitals in the neighbourhood of other ports when the arrival of hospital ships at the latter was anticipated. By this means the running of empty trains to meet the ships was avoided and much saving in expenditure of fuel on "light-running" effected. This system of avoiding "light-running" was applied in a variety of other ways in the movement of ambulance trains.

The personnel of an ambulance train consisted of an officer and eleven other ranks of the R.A.M.C., permanently on board. The personnel originally detailed were the nucleus staffs of the territorial force clearing hospitals, each of which consisted of one or more officers and five or six other ranks. As their units were gradually mobilized for service overseas they were replaced by staffs from their 2nd line units, or by R.A.M.C. personnel from the company at Southampton. Without exception they proved efficient and zealous, and the effective working of the ambulance trains at home was in a great measure due to their efforts and enthusiasm. Two nursing sisters were detailed for each journey. They were accommodated in a home near the railway stations at Southampton and Dover when their train was not running. Nursing sisters did not accompany the passenger trains carrying sitting cases.

An important element in the distribution of sick and wounded was their detraining and transportation from the trains to the hospitals. Entraining at the ports of reception has already been noted as carried out by men of No. 48 Company, R.A.M.C., or by voluntary aid detachments and men detailed from local hospitals. The detraining and transportation at the end of the journey was almost invariably carried out by voluntary workers, both men and women, of all classes. The work accomplished by them, on many occasions at great personal inconvenience and sacrifice of valuable time, has been everywhere referred to with expressions of praise and admiration. Convoys arrived at any hour of the day and night, and those who had registered themselves for duty at the railway station were invariably there on the arrival of the trains. Local automobile clubs rendered great assistance in many localities in organizing the transportation to the hospitals, as did also branches of the St. John Ambulance Brigade and St. John

Ambulance Association, and voluntary aid detachments of the British Red Cross Society. In the " Preliminary Instructions " commands were instructed to consult the secretary of the Automobile Association and Motor Union with a view to organizing the allotment of motor transport to hospitals ; and to keep registered voluntary aid detachments informed as far as possible of the movements of sick and wounded by ambulance train to enable them to form rest and refreshment stations at selected stopping places during the longer journeys. These refreshment stations as a rule were not necessary, however, for the ambulance trains carried all that was required for the journey, but they proved excellent and much appreciated institutions, particularly those established at Birmingham and Peterborough, for emergency trains and trains making long journeys. In some cases difficulties arose in the early months of the war in arranging accommodation for rest and refreshment places within the railway station premises.

In order to relieve the Southampton distributing centre of congestion two special units were established in connection with it, the University War Hospital in the new university buildings there, and the Eastleigh Clearing Hospital, to which reference has already been made. The former was intended for the reception of serious cases considered unfit for longer journeys and it also served as a reception hospital for the retention of patients desirous of going to hospitals near their own homes until an ambulance train was being despatched to the locality concerned. The latter was for the temporary reception and detention of lighter cases pending their distribution to hospitals throughout the country or their discharge to duty.

There was some difficulty at first in determining the number of beds which should be kept vacant for the sick of the troops in camps, billets and garrisons at home, and of the Central Force, for which the territorial force general hospitals were originally intended. Owing to the vacant beds in the territorial force general hospitals gradually being filled by sick and wounded from overseas, it became necessary, as early as the 1st October, 1914, to issue an instruction that 300 beds should be kept in each of these hospitals for sick of the Central Force, and any of them unoccupied were not to be notified to the D.M.S. Embarkation as vacant in the telegram sent to him of beds available for convoys from overseas.

In the early days of the war a large number of Belgian sick and wounded were disembarked in English ports. As many as 57,000 were received during 1914 and 1915 into civil and other hospitals in the United Kingdom, amongst these were 243 Belgian officers and 9,100 Belgian other ranks, who were sent

to military hospitals in all commands by the embarkation medical staff from their distributing centres, and transferred to auxiliary hospitals and private convalescent homes, when sufficiently convalescent, in the same manner as British sick and wounded. But early in 1915 arrangements were made by the Belgian military authorities for opening Belgian hospitals for convalescent Belgian soldiers. These were known as King Albert's Hospitals, and were four in number—three in London and one in Folkestone. They were ready to receive convalescent soldiers of the Belgian Army at the end of February, 1915; and, in April following, all those in private convalescent homes were transferred to them.

Sick and wounded prisoners of war were also received and distributed in the earlier stages of the war to the British military hospitals in the same manner as British sick and wounded, and thus occupied beds in hospitals in all the commands. Special hospitals were subsequently established for them or wards allotted in certain selected military hospitals.* The sick from prisoners of war camps formed throughout the country in 1914 were also admitted in the earlier years of the war to the military hospitals in their neighbourhood.

The responsibilities of the D.M.S. Embarkation were originally confined to the supervision of the disembarkation and distribution of the sick and wounded. He had no administrative responsibilities in connection with hospital ships which mobilized as units on the lines of communication of the expeditionary force. But when other and larger hospital ships were mobilized, as happened immediately, there were no clear instructions regarding the scale of ordnance stores, equipment and personnel for ships of varying size. They were fitted as such by the Admiralty authorities, the medical personnel and surgical and medical stores were detailed by the directorate of medical services at the War Office, but the medical officers appointed to the charge of hospital ships had to obtain their ward utensils, hospital clothing, and other equipment by requisition on ordnance stores. As many of these officers were inexperienced officers with temporary commissions, in the earlier days of the war some of the large hospital ships went to sea with insufficient equipment; and there were also considerable anomalies in the scale of personnel detailed for duty on board. To obviate this the

* The principal hospitals for prisoners of war were the Dartford War Hospital, the Prisoners of War Hospitals at Belmont, in Surrey, and Brocton, in Staffordshire, the military hospitals at Fargo and Sutton Veny in the Salisbury Plain area, at Oswestry in the Western Command, at Stobs in Scotland, and the Nell Lane Military Hospital, Manchester. Acute mental, enteric and dysentery cases were provided for in the special hospitals for such cases.

responsibility of equipping all hospital ships, except in matters which were dealt with by the Admiralty, was added to the duties of the D.M.S. Embarkation. Scales were then drawn up for establishments of personnel, medical and surgical stores and ordnance equipment according to the size of a ship; and standing orders and instructions for the officers in charge were issued.*

The duties of the D.M.S. Embarkation were thus enormously increased. At one time approximately 100 hospital ships and ambulance transports, with a total personnel of 485 officers, 836 nursing sisters, and 4,221 other ranks came under his administrative control. The personnel was calculated on a scale of one officer, two nursing sisters and 10 other ranks to every 100 equipped beds. Some of the hospital ships were of very large size, such as the "Aquitania," "Britannic," and "Mauretania"; the first, for example, being equipped to carry 4,000 sick and wounded.† Every requirement for medical and surgical treatment was provided, but it was found that, except in times of great emergency, these very large ships were not so generally useful as ships of moderate size. Only a limited number of harbours were capable of berthing them, and it was not always possible to secure a sufficient number of patients at a given time and place to fill them. The most efficient and economic unit was a hospital ship of 800 beds. Ships of this size could also carry a large number of lighter cases on deck in cross-channel work, and were well adapted for long distance voyages. The "Asturias" was a typical hospital ship of this class. It accommodated 800 patients in cots and berths, and in times of emergency as many as 2,400 were carried by it on one cross-channel journey.

Increase in the number of hospital ships commenced in the earliest days of the war. The "Asturias" and "Carisbrooke Castle," which became military hospital ships in August and September, 1914, were originally chartered as naval hospital carriers by the Admiralty, and with the "Oxfordshire," which was acquired as a hospital ship shortly afterwards, and the three small cross-channel hospital ships mobilized with the expeditionary force, were the only ships employed in the earlier months of the war in the conveyance of sick and wounded from France to England. The first voyage with patients from France was made by the "St. Andrew." It arrived at Southampton on the 28th August.

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* Standing orders and instructions were also issued for officers in charge of ambulance trains at home.

† On one voyage the "Aquitania" carried 5,000 patients, and 20 ambulance trains were required for distributing them.

The demand for more and larger ships continued and urgent requests for two more ships similar to the "Asturias" were made towards the end of November, in consequence of the large number of wounded and sick accumulating in the base hospitals in France after the first battle of Ypres and the onset of the cold weather with its toll of foot troubles and other complaints. The "Valdivia" and "Salta" were then taken up, and a cargo boat, the "Glenhead," was sent to Boulogne at the end of November for patients not requiring cots. Its only accommodation, however, was a hold and an exposed iron deck, and the military authorities in France considered it unsuitable for the purpose and sent it back empty.

In the meantime the Indian contingent had arrived in France, and hospital ships, prepared for Indian sick and wounded, were made available for British. They had been admirably prepared, were large and comfortable, and were in every respect suitable for British as well as for Indian patients. It was first intended that Indian sick and wounded should be transferred by rail to Marseilles, and from there evacuated to Egypt and Bombay. The general policy was the subject, however, of much discussion between the Government of India, the War Office and the India Office, and resulted in the India Office eventually negotiating direct with the Admiralty for the preparation of its hospital ships.* The War Office was consequently informed by the India Office on the 2nd October that six ships, the "Sicilia," "Glengorm Castle," "Guildford Castle," "Goorkha," "Glenart Castle," and "Syria" had been engaged by it as hospital ships.

Owing to the difficulties in arranging transport of Indian sick and wounded by rail to Marseilles the intention of using that port as the base for the hospital ships was abandoned, and in October arrangements were made for the reception of Indian patients into hospitals in the south of England. The "Glengorm Castle" and "Guildford Castle"† were then allotted for employment as channel service hospital ships and sailed for Boulogne on the 20th October. The other hospital ships for Indians were to be employed in taking Indian sick and wounded from England to Egypt, and from Egypt to Bombay; but the arrangements which were being made between India,

* Negotiations were commenced on receipt of a telegram from the Viceroy of India, on 4th September, estimating that some 1,300 sick and wounded would require to be sent back to India monthly; and asking the War Office to have at least half of the eight ships, considered necessary, available soon after the arrival of the Indian contingent in France.

† The "Guildford Castle" was damaged in collision with the "Carisbrooke Castle," and the "Goorkha" took its place.

Egypt, the India Office, the War Office, the Admiralty and the military authorities in France appear to have been considerably confused and orders and counter-orders were of frequent occurrence, especially in connection with the sailings of the ships, and also in connection with their personnel. Indian personnel for the ships had not arrived from India when the ships were taken up and prepared in England and had to be obtained by depleting hospital units in France and placing some R.A.M.C. personnel on board. It was eventually decided in November that the Quartermaster-General at the War Office would take over their management from the India Office in order to avoid confusion and conflict of instructions.

The reception and distribution of Indian sick and wounded in England thus came under the administrative control of the D.M.S Embarkation, and an Indian Medical Officer* was added to his staff. He had also to arrange for the embarkation of Indian invalids who were being transferred from England to Egypt and Bombay. At first the distribution of sick and wounded Indians was complicated by the lack of hospital accommodation for them in England. Temporary accommodation was prepared at Netley; and the "Sicilia" was sent to Marseilles to convey an Indian General Hospital to England. The "Sicilia" arrived in Southampton on 31st October, 1914, but was retained as a stationary hospital ship at Southampton to supplement the accommodation at Netley, until the general hospital, which was sent to Brockenhurst, was opened. The "Glengorm Castle" and the "Goorkha" were also kept full of patients as stationary hospital ships at Boulogne and also at Southampton until hospital accommodation on shore was ready. By December hospitals for Indians were established in the Pavilion at Brighton, and in Mont Dore Hotel, Bournemouth, with a convalescent depôt at Barton-on-Sea. All these hospitals came under the administration of the War Office; and the reception and distribution of Indian sick and wounded continued to be carried on by the Embarkation Medical Staff at Southampton in the same manner as for British sick and wounded until the departure of the Indian Contingent from the Western Front in October, 1915†.

In 1915 the extension of British operations to Egypt, the Dardanelles and Macedonia led to great additions to the fleet of hospital ships, for the administration of which the D.M.S.

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* Lieut.-Colonel MacNab.

† Indian Cavalry Divisions and Indian Labour Companies remained with the Expeditionary Force in France till the end of the war, and the original scheme for evacuating them to Marseilles was adopted when the Indian hospitals in England were closed.

Embarkation became responsible.* Hospital ships were sent to the Eastern Mediterranean in the spring of that year; but, after the landing at Cape Helles and subsequently at Suvla Bay, a number of transports, including the "Aquitania," had to be prepared hastily for bringing wounded to England. The "Britannic" and "Mauretania" were also fitted out as hospital ships in 1915. The alterations necessary to convert them into hospital ships were carried out on their return to England. They were well equipped for surgical work, and urgent operative surgery was carried out to a great extent during voyages from the Dardanelles or Mudros to Egypt, and occasionally direct to England, more especially on the "Asturias," which was diverted from channel service for the purpose, and on the "Delta" and "Nevassa." These ships were based at Alexandria, but on their arrival at Southampton their medical services and requirements came under the control of the administrative medical staff for embarkation there.

Torpedo attacks on hospital ships by enemy submarines or their destruction by mines have already been accepted as authenticated facts in the history of the war, although at no time were the conditions of the Geneva Convention as applied to naval warfare transgressed by the British.† It seemed as if the distinctive painting of hospital ships, white with a green band, marked them out for attack on account of their visibility. It was consequently determined that all distinctive marks on hospital ships, employed on the channel services at any rate, should be removed. They then no longer claimed the protection of the Geneva Convention and sailed as ordinary transports. Their equipment remained the same, but they were designated "ambulance transports" in place of hospital ships, were armed to repel attack, were entitled to a naval escort when necessary, and sailed under the Red Ensign.

Sixteen hospital ships, including the naval hospital ship "Rewa," were lost.‡

The disposal of sick and wounded after their distribution to hospitals only came under the control of the D.M.S.

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* The administration of hospital ships was not definitely transferred from the lines of communication France and the Mediterranean to the D.M.S. Embarkation at Southampton until April, 1916. The hospital ships east of Suez were based on Bombay for administration and did not come under his control.

† The Admiralty authorities were vigilantly on their guard against infringements of the Convention. It was suggested at one time, for example, that Indian patients transferred to Egypt could return to France, when fit for discharge, in an Indian hospital ship returning empty to England. The Admiralty, however, pointed out that soldiers returning to duty could not be conveyed in hospital ships, and any instructions to that effect were cancelled.

‡ *See* Appendix C.

Embarkation when patients had to be transferred by ambulance train from one hospital to another, or from hospital to a port for repatriation to India or the Dominions. They were retained in hospitals so long as they were in need of hospital treatment. For discharge from hospital they were classified as

(I) Fit for duty,
(II) Fit for a command depôt,
(III) Fit for employment in home garrisons or labour companies.

Men classified under I or III were discharged to their reserve units, where they were hardened or trained for drafting overseas, or for duty at home. Those classified for command depôts were men who though no longer in need of hospital treatment were unfit for the hardening and training in their reserve units, but who would be likely to be fit in six months. Only sick and wounded from an expeditionary force could be sent to a command depôt. But patients permanently unfit for any kind of military service were discharged from the army to civil life. Convalescents not fit for discharge were transferred to convalescent hospitals or auxiliary hospitals. They could be discharged from convalescent hospitals under the same classification as from central hospitals; but patients in auxiliary hospitals and all patients permanently unfit for military service were returned to the central hospitals for disposal.

The distribution and disposal of sick and wounded officers were specially legislated for. At the beginning of the war many irregularities occurred. Several officers arrived in England in private yachts and other vessels and disappeared for the time being from military control. The system of granting officers sick leave instead of retaining them under hospital treatment proved unsatisfactory and led to delayed or imperfect recovery. In March, 1917, an instruction was consequently issued to the effect that all sick and wounded officers below the rank of colonel were to come under the same rules for reception, distribution and disposal as other ranks, and one large hospital, the Prince of Wales' Hospital,* was opened for them in the Great Central Hotel, Marylebone. Other hospital accommodation had been allotted for officers in central and special hospitals throughout the country, and the only distinction eventually made between the distribution of officers and the distribution of other ranks was the method of transferring them to auxiliary hospitals, convalescent hospitals, and command depôts. In the case of other ranks, central

* It was at first called an Officers' Command Depôt, but in August, 1917, the name was changed to Prince of Wales' Hospital for Officers.

hospitals transferred patients on their own responsibility under the supervision of the A.D.M.S. of their district and D.D.M.S. of the command. In the case of officers, however, when a patient required transfer to a military convalescent hospital, to an officer's auxiliary convalescent hospital, or to a command depôt, the transfer was effected only through the officers' transfer department, which was centralized in the office of the Director-General at the War Office.* A sick and wounded officer's transfer card was forwarded to the War Office by the officer in charge of the hospital, from which the officer was to be transferred, giving particulars of the case and recommending the locality to which transfer should be made. The transfer department at the War Office then allotted the convalescent hospital or command depôt to which the case should go, and forwarded the transfer card to the latter. Transfer was then carried out in direct communication between the officers in charge of the hospital or command depôt from and to which the case was being transferred. Every sick and wounded officer was examined by a medical board as soon as possible after his arrival from overseas; and the board decided his fitness for general service, garrison or other service abroad, home service, active or sedentary, for admission to a command depôt or for treatment in an officers' convalescent hospital or in an officers' hospital. In the event of an officer being classified for hospital treatment he could afterwards be transferred to convalescent treatment or a command depôt only through the War Office transfer department. This centralized transfer arrangement did not work altogether satisfactorily, especially on account of the inconvenience and delay in the transfer of documents and in the arrangements for subsequent medical boards; but on the whole it tended to diminish the number of complaints and to remove a considerable amount of confusion.

The disposal of special cases of diseases or injuries amongst British and Dominion troops led to frequent instructions being issued and modified from time to time as new hospitals for them were opened, new methods adopted and new additions made to the class of cases regarded as special. As regards the disposal of enteric and dysentery convalescents, in no case could they be sent to convalescent hospitals or command depôts. Enteric patients when bacteriologically free from infection after two examinations at an interval of seven days, and if then fit for discharge, were sent to the enteric depôts at Shirley (near Croydon), Woldingham, and Warlingham, which were opened in

* *See* p. 62, Chapter IV.

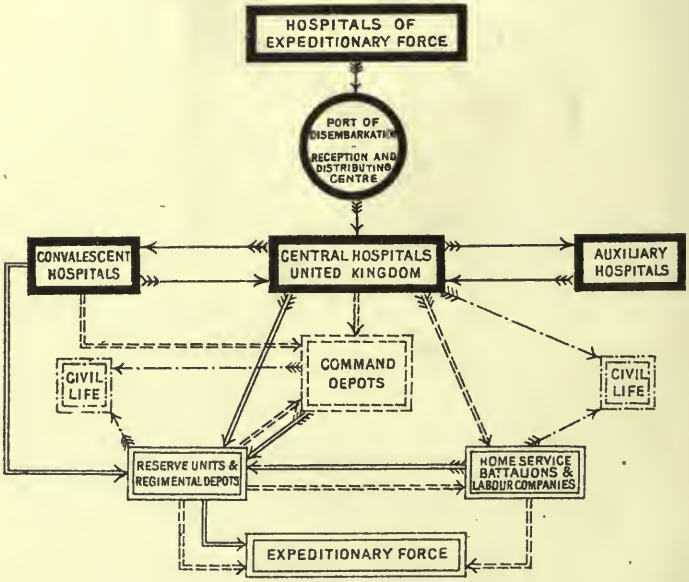
1916 and 1917. Until then they could be transferred to Class B auxiliary hospitals under observation for one month. Two examinations were made during that time, and if the results were negative the patient was discharged to his reserve unit, where three further examinations were made before he could be posted to a reinforcement draft. These rules were modified and relaxed before the end of the war, when only one further examination was made at the enteric depôt, but the patient remained in it three months before being drafted to his reserve unit. Enteric depôts were commanded by combatant officers and in all respects treated as command depôts. They were established to avoid sending possible enteric carriers to other command depôts. Dysentery patients were distributed on arrival to specially selected hospitals. They were there submitted to treatment and to bacteriological and protozoological examination. When no longer in need of hospital treatment they were transferred to the dysentery convalescent hospital, Barton-on-Sea.* An additional examination was made there three weeks after termination of treatment or previous negative examination. The patient could then be discharged in the same manner as from other convalescent hospitals, if otherwise fit. The dysentery convalescent hospital was a hospital under the command of a medical officer, and not, as in the case of the enteric depôts, a command depôt.

As regards the distribution and disposal of other special cases, blind patients were sent to the 2nd London General Hospital, Chelsea, heart cases to the Sobraon Military Hospital at Colchester,† face and jaw cases to Queen Mary's Hospital, Sidcup, orthopædic cases to a number of what were eventually in 1918 designated special military surgical hospitals in the various commands, and neurological cases were similarly distributed to special neurological centres. Mental cases went in the first instance to Netley, which acted as a clearing hospital for such cases, and later on to one of the asylums opened as war hospitals where they came under the superintendence of the trained asylum staff taken over by the military medical services. Rheumatism and kindred complaints were provided for in Buxton, Harrogate, Bath, and Llandrindod Wells. The disposal of amputation cases was regulated by the readiness or otherwise

* After this was closed in 1919, the Addington Park War Hospital became the dysentery convalescent hospital and also a central dysentery hospital.

† The heart centre at Colchester was intended for special cases which could be cured by graduated physical training. Heart cases for special study and treatment went to the Mount Vernon Hospital, Hampstead, but this was closed after the Colchester Hospital had opened. Heart cases were also treated at other hospitals on the same principles as at Colchester.

TABLE SHEWING DISTRIBUTION AND DISPOSAL OF SICK AND WOUNDED ARRIVING FROM AN EXPEDITIONARY FORCE.



REMARKS:-*This table does not include all details of the movement of sick & wounded in the United Kingdom but represents the general system of their distribution & disposal. Details left out are transfers to & from special hospitals and direct admissions to primary auxiliary hospitals. The black squares & lines indicate medical units where sick & wounded are under treatment. The interrupted double square represents non-medical units, where men are hardened for fitness to be drafted to expeditionary forces. The double lines indicate the movement of men fit for drafts. The interrupted double lines indicate movements of men not yet fit for general service drafts, but fit for home service battalions or labour and employments with the expeditionary forces. The dot & dash lines & squares represent movements of men discharged as permanently unfit for military service.*

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Malby & Sons, Lith.

for fitting of artificial limbs, and hospitals were provided for the reception of limbless men waiting fitting.

When it became necessary to send malarial convalescents from Salonika to England special instructions were issued for their disposal. Such patients were designated " Y Group, Malaria Cases." If they required hospital treatment on arrival they were sent to the University War Hospital, Southampton, and transferred from there to malaria centres in specially selected hospitals elsewhere. If admission to hospital was not considered necessary they were sent to their regimental depôts with a malaria card and with instructions regarding their continuing quinine treatment for thirty days. The arrangement did not prove satisfactory, and a new policy was adopted in 1918 by which malaria concentration centres were opened in commands for all malarial cases not requiring hospital treatment, with a view to their being kept under specialist observation and drafted to a special depôt for them in France. This arrangement had come into operation only shortly before the end of the war.

Venereal patients were not generally transferred from expeditionary forces to England till after the Armistice, but special hospitals for venereal cases occurring amongst troops in the United Kingdom were opened in each command. The disposal and treatment of several other special classes of sickness and injuries were also the subject of instructions.

The organization for the reception and distribution of sick and wounded and the general movement of sick and wounded on transfer from hospitals of the expeditionary forces to hospitals in the United Kingdom are illustrated in the diagrams.

CHAPTER VII

THE MEDICAL EXAMINATION OF RECRUITS

THE various changes which took place in the system of recruiting for the army during the war had a profound influence on the medical services engaged in the work of medical examination of recruits. In the earlier months there was a short period of unrestricted voluntary enlistment, during which there was a wild rush of recruits who swamped the general arrangements for their reception and medical examination. The existing organization, when war was declared, was a peace organization, capable of dealing with 50,000 recruits annually. Recruits were examined at regimental depôts or recruiting centres by officers of the R.A.M.C. on the active or retired list, or, in some localities, by civil medical practitioners at a fee of 2*s.* 6*d.* for each recruit examined. Their work was supervised by medical inspectors of recruits, appointed to each command since 1905.* When the rush of applicants for enlistment occurred at the beginning of the war, not only was the number of experienced medical examiners insufficient, but the accommodation for examining recruits was totally inadequate. In September, 1914, for example, as many as 500,000 came up for enlistment. Large numbers of civil medical practitioners who had never previously examined recruits and who were ignorant of the physical requirements for the army had to be entrusted with the duties of medical examinations; but although instructions had been issued on August 1st regarding the physical examination of recruits, followed by notes for the guidance of examining medical officers, the most diverse results were obtained, and many men were admitted into the army unfit for general service. Although many were discharged before joining a draft for overseas, a certain number went to France where they became a serious encumbrance and were returned to the base immediately after joining their units in the field. Many of the disabilities from which they suffered were sufficiently pronounced to have been detected at the time of the medical examination; and, while it was recognized that the results of the examinations by inexperienced civil examiners

* Medical inspectors of recruits were withdrawn on the outbreak of war for duty with the expeditionary force, but were subsequently replaced.

would necessarily fall below those obtained by officers of the regular medical service, the bad work brought to the notice of the Army Council could only in part be accounted for in this way and was in many cases due to the medical examiners attempting to inspect more recruits in a day than could be examined properly in the time.

To remedy this state of affairs several measures were adopted. The flow of recruits was regulated and only those whom the military authorities could dispose of were medically examined and posted to units. Others could register their names as willing to serve when called upon. Registration was carried out by means of index cards, the names being submitted to a parliamentary recruiting committee or by personal application at a recruiting office. The cards were kept at the headquarters of the recruiting area and were for two classes, those willing to serve but wishing to defer enlistment to a later date, and those who could not be accepted at once owing to shortage of accommodation or other causes preventing their disposal by the military authorities.

Shortly afterwards, in December, 1914, the Army Council also issued an instruction limiting the number of recruits whom one doctor should examine to six or eight in an hour, or 30 to 40 in a day. More civil medical practitioners were employed when necessary, and, in order to ensure greater care and thoroughness, civil medical practitioners were required to agree as a condition of their employment to the 2*s.* 6*d.* fee being withheld or recovered in the case of each recruit discharged as medically unfit after joining.* For this purpose commanding officers and medical officers of units were instructed to inspect each recruit on joining in order to discover if he were suffering from any gross disability and not likely to become an efficient soldier.

Notwithstanding these measures, the results of the medical examination of recruits continued to be unsatisfactory; and men were still being discharged from the army with less than three months' service or sent back as unfit from the expeditionary force, the chief disabilities from which they suffered being hernia, varicose veins, defective vision, deficient teeth,

* In February, 1915, the maximum fee for a full day's work was limited to £2; but as this represented only 16 examinations at 2*s.* 6*d.* each, the capitation grant of 2*s.* 6*d.* did not induce an examiner to examine up to the number of 40 daily. This was rectified in March, 1915, by a tariff of payments allowing 2*s.* for each recruit up to four, 10*s.* for examining nine recruits, 20*s.* for examining 19, 30*s.* for 29, and the maximum of 40*s.* for 30 or more. The penalty of withholding or recovering the fee was modified in June, 1915, and only enforced when the D.D.M.S. of the command considered that there was distinct carelessness on the part of the medical practitioner.

middle-ear disease, debility and old age. In December, 1914, orders were consequently issued for an inspection of all trained soldiers and recruits in the United Kingdom, and medical inspectors of recruits were instructed to visit the chief recruiting centres in their command and satisfy themselves as to their general suitability, ascertain whether the tests of physical fitness were being adhered to, see that no medical officer was examining more recruits in a day than could be properly examined, and personally examine all recruits rejected under three months' service.

Although pressure on recruiting medical officers had for the most part ceased by March, 1915, there was much lack of uniformity in the standards of selection, and an effort was made to secure uniformity of standard amongst reinforcement drafts by appointing standing medical boards in all stations where there were units furnishing drafts for service abroad. Instructions for the formation of these boards were issued on 3rd March, 1915. Each board consisted of two or three medical officers, one of whom was to be a regular officer of the R.A.M.C. not below the rank of captain. They were to examine all men reported by the unit as unfit for service abroad and classify them as

A.—Fit for service at home or abroad.
B.—Temporarily unfit for service abroad.
C.—Fit for service at home only.
D.—Unfit for service at home or abroad.

This was the beginning of classification according to medical fitness, from which the various categories under the Military Service Act were subsequently evolved.

These boards did not, however, replace the medical examination of recruits by civil medical practitioners throughout the country, who continued to examine recruits as before; but another description of medical board, the Travelling Medical Board, was established in July, 1915, with functions very similar to those of the standing medical boards. Travelling medical boards were appointed originally for the purpose of inspecting and classifying all men reported by local medical officers as permanently or temporarily unfit for foreign service, and any others who, for medical reasons, were not included in drafts for overseas. Men who were reported locally as permanently unfit for military service, but whom a travelling medical board considered fit for some kind of service, were to be removed from the category of permanently unfit and re-classified in the same manner as they were classified by the standing medical boards. In fact, travelling medical boards appeared then to

have been instituted as boards for the revision of the work of the standing medical boards or for supplementing them. The situation, however, was by no means clear and had subsequently to be explained to commands in a War Office letter of the 21st September, 1915, in which the functions of travelling medical boards were defined as being mainly for controlling and diminishing the large numbers of men returned as unfit for duty, and for classifying the remainder in the categories already indicated in their original constitution. On the 3rd September, 1915, for example, the attention of the commands was drawn to the fact that throughout the country a total of 15,801 men, who had been more than sixty days with their units, had been returned as temporarily unfit. Certain units had as many as 250. Commands were then instructed to establish treatment centres for these men, and, if necessary, to engage masseurs and masseuses with systematic arrangements for continuous treatment under the supervision of the medical officer in charge. It was out of these treatment centres that the conception of command depôts appears to have developed.

Standing medical boards were to continue the primary inspection, and the travelling medical boards, while co-ordinating and superintending the work, were only to see the men whom the standing medical boards returned as unfit for full duty, or such numbers as they might direct should be brought before them. It was not anticipated that the travelling boards would be able to inspect all men reported unfit, and it was suggested that they should inspect batches as test cases in order to evolve a uniform standard of unfitness and ensure that all temporarily unfit men in reserve units or doing light duty in depôts should be made fit for drafts in the shortest possible time. The boards were to report on the time when temporarily unfit men would be likely to be fit, that is to say, within a month, within two months, within six months, or not until after six months.

A travelling medical board was thus a more authoritative board than the standing medical board. It consisted of two medical officers of senior rank and a combatant officer of the rank of colonel or lieut.-colonel. At first two such boards were appointed to the Eastern, Southern and Northern Commands, and one to each of the other commands, but their number was subsequently considerably increased.

During the period of voluntary enlistment in 1915, this system of medical examination and supervision of recruits and men regarded as unfit for drafts thus became somewhat involved. There was first of all examination of the recruit by a civil medical practitioner, supervised by a medical inspector of recruits and reviewed by the commanding officer and medical

officer of the unit to which the recruit was sent. Then there was classification by a local standing medical board of recruits and all men returned by the unit as medically unfit, followed by a further inspection and classification of them by a travelling medical board under the administrative supervision of the D.D.M.S. of the command.

It was evident that a system of this kind could not continue. It failed in its endeavour to attain uniformity of standard in the various categories, and was frequently the subject of public criticism. The first step towards reform was taken in December, 1915, after Lord Derby became Director-General of Recruiting. Medical examination of recruits by individual civil medical practitioners was then abolished and replaced by examination by recruiting medical boards, consisting of a president and three or four members. The president was to be a regular officer of the R.A.M.C., if possible; the other members were to be selected civil medical practitioners, who had gained experience in recruiting. Recruiting medical boards assembled at each regimental depôt and at the central recruiting office of each of the recruiting areas. In city areas there were two such boards.

The classification of men called up for service was then made more extensive. Five main categories with sub-categories were introduced as follow:—

(1) Fitness for general service;
(2) Fitness for field service at home;
(3) Fitness for garrison service:
    (*a*) abroad,
    (*b*) at home;
(4) Fitness:
    (*a*) for labour, such as road-making, entrenching and other works, and:
    (*b*) for sedentary work only, such as clerical work;
(5) Unfitness for any military service.

Travelling medical boards revised the classification, when necessary, and were the authority by which a recruit's category after he had been attested could be lowered; but the standing medical boards were not abolished, although it is not quite clear in what way they were employed except to supplement the work of the travelling medical boards.

In 1916 the Military Service Acts came into force; the first in January providing for compulsory service of unmarried men between the ages of 18 and 41, and the second in May, making these provisions applicable to married men. They led to several changes in the medical classification of recruits, and also

extended the new system of classification to all serving soldiers and men sent home sick and wounded from an expeditionary force or garrison abroad. These changes took place in June, and were followed by the abolition of the standing medical boards the same month and of the medical inspectors of recruits in August following, the latter becoming presidents of additional travelling medical boards which had practically assumed their functions.

The new classification was that of the lettered categories, which afterwards became so widely known throughout the Empire. Each of the lettered categories had sub-numbers and were as follow :—

Category A.—Men fit for general service, i.e., able to march, see to shoot, hear well, and stand active service conditions.

(i) Men fit for despatch overseas in all respects as regards training and physical and mental qualifications.

(ii) Recruits who should be fit for category Ai when trained.

(iii) Men returned sick or wounded from an expeditionary force who should be fit for Ai when hardened.*

(iv) Recruits under 19 years of age.†

Category B.—Fit for service abroad, but not for general service ; i.e., free from serious organic disease, and able to stand service conditions on lines of communication in France or in garrisons in the Tropics.

(i) In garrison or provisional units.

(ii) In labour units, or in garrison or regimental outdoor employment.

(iii) On sedentary work as clerks and storemen only.

Category C.—Fit for service at home only ; i.e., free from serious organic disease, but only able to stand service conditions in garrisons at home.

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* Hardening of a man discharged from hospital to his reserve unit consisted of marching for the first week without arms for 1 mile morning and afternoon ; for the second week, 2 miles quick march, morning and afternoon ; for the third week, 4 miles morning and afternoon under the same conditions ; in the fourth week, full duty ; in the fifth week, ready for drafts. A man discharged from a command depôt or convalescent hospital to his reserve unit was placed at once in Category Ai.

† This sub-number was added on the 21st June, 1916.

Category C—cont.

(i) In garrisons or provisional units.
(ii) In labour units or regimental outdoor employment.
(iii) On sedentary work as clerks, storemen, bâtmen, cooks, orderlies, and on sanitary duties.

Category D.—Men temporarily unfit for Categories A, B, or C.

(i) In command depôts.
(ii) In regimental depôts.
*(iii) In any unit or depôt under or awaiting medical or dental treatment.

Category E.—Men unfit for service in Categories A, B, or C, and not likely to be fit within six months.

As regards the classification of men in the sub-numbers of categories B and C, the categories Bi and Ci were intended for men able to march at least 5 miles, see to shoot without glasses, and hear well; Bii and Cii for men able to walk not more than 5 miles to and from work, and to see and hear sufficiently for ordinary purposes; and Biii and Ciii for men suitable for sedentary work only.

Men from overseas who were discharged to duty from hospital were classified (1) as fit for general duty, in which case they went to their reserve battalion as Ai, or (2) fit for light duty and likely to be fit for drafts in three months, when they went to the regimental depôts† as Aiii, or (3) fit for light duty but not likely to be fit for drafts in three months or requiring some special medical treatment, when they went to a command depôt as Bi; or unlikely ever to be fit for drafts, when they went to a reserve or provisional battalion, as Bi or Ci.

A man considered unfit for further service by the medical officer in charge of a unit came before a travelling medical board which classified him in any of the above categories or discharged him from the service. Travelling medical boards had also to examine and classify or discharge from the service all men who were more than six months in category D, and see all soldiers not classed in category A, as well as those considered by the medical officer of the unit as unfit to remain in that category.

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* This was a temporary category for men of higher category in reserve units. They automatically rejoined their original category after their treatment was finished.

† In the case of T.F. men, to a command depôt.

The results of this new system were more or less satisfactory, although differences in standards adopted by different recruiting medical boards did not cease to become a source of difficulty and complaint. The responsibility of the D.D.M.S. of commands for visiting boards and maintaining a uniform standard was emphasized but the task was impossible under the circumstances, and the number of men who complained of the category in which they were placed was considerable. To deal with such complaints, appeal tribunals had been set up by the Local Government Board, and in October, 1916, a special medical appeal board* was established at the Royal Army Medical College in London, to re-examine and classify men, whom the tribunals considered should be re-examined on medical grounds. An independent inspector of recruiting medical boards in the department of the Director-General of Recruiting at the War Office was also appointed, in November, 1916, to establish throughout the country uniformity in the medical examination of recruits. Colonel J. Galloway, R.A.M.C. (T.F.), was entrusted with the duties. He had been recalled for this purpose from France, where he held the appointment of consulting physician to the 1st and 2nd Armies.

After an inspection of the work of boards he submitted a report to the Director of Recruiting emphasizing the need of better accommodation for medical examinations and suggesting a scheme of examination by team work,† instead of by one member undertaking the whole examination of a single recruit. Instructions to this effect were issued in February and again in August, 1917. Travelling medical boards, as originally constituted, were abolished and reconstituted at the beginning of 1917 to consist of a permanent president, the senior medical officer of the station where the board happened to be sitting, and the medical officer and the commanding officer of a unit which was not being examined. Their functions remained much the same as before.

On the 5th April, 1917, the Military Service (Review of Exceptions) Act came into force. It was the subject of a long Army Council Instruction, issued in the same month, in

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* The board sat under the presidency of Colonel Lynden-Bell, A.M.S., and consisted of two temporary R.A.M.C. officers, two civil medical practitioners, two consulting surgeons, and two consulting physicians. In March of the following year similar boards were appointed at Leeds and Edinburgh, and in July, 1917, an additional appeal board was established in London.

† Team work meant the examination of a recruit by each member of the board in rotation; the first examiner confining himself to the eyes, ears and teeth, the second to the limbs and joints, the third to the external parts of the body, and the fourth to the chest and internal organs, while the president completed the necessary documents and classified the recruit.

which an endeavour was made to explain the complicated nature of the Act and the procedure to be followed in giving effect to it. It was anticipated that some 950,000 men who had previously been exempted would be called up for examination under the Act. The Act was unpopular and its application raised a storm of hostile criticism in and out of Parliament, directed mainly against the manner in which medical examinations and re-examinations were being carried out, and against the methods and standards adopted in classification of recruits.

The army medical administration and the medical profession as a whole had been set a task which was medically and physically impossible to carry out accurately and well. All kinds of accusations were brought against the recruiting medical boards. It was asserted that blind, maimed and crippled were being passed into the army; that the examinations were hurried, casual and perfunctory; that there was lack of courtesy on the part of members or presidents of certain boards and that they ignored the certificates of family doctors; that presidents categorized recruits without reference to other members of the board; that men were kept for hours waiting examination or were, during examination, left stripped of clothing for unnecessarily long periods. In fact, it was felt generally that the unpopular Military Service Acts were being carried out tactlessly and that the irregularities and apparent inconsistences of the medical examinations and re-examinations were having a bad effect on the national temper.

Isolated instances no doubt occurred in which the procedure of a medical board was responsible for the widespread feeling of resentment against the medical examinations generally; but most of the trouble arose from the system of registration and calling up of recruits, and the fraudulent practices which arose in connection with impersonation, doping, and other means, adopted to escape military service. A military register had been formed in connection with the National Registration Act, which was passed as long ago as August, 1915. It was a register which in its very essence could never be kept up properly, and in May, 1916, Sir Auckland Geddes, when he became Director of Recruiting, found approximately 1,000,000 errors in it; but, owing to the errors, many cases occurred of men being called up wrongly or unnecessarily. Fraudulent practices occurred in the sale of rejection certificates, and it is on record that it became an industry to turn out forged War Office classification cards. Impersonation was of frequent occurrence. One form of it was peculiar. When

a man who was stone blind or who had two wooden legs was called up, a man in perfect health appeared for medical examination in his place and was passed fit, the name entered being that of the blind or cripple and not of the man examined, so that when the latter was called up in due course as having been examined and passed fit for general service the calling-up notice went to a blind or crippled man who reported for service in his place. Instances like this could not fail to excite popular comment on the work of the military medical boards, and civil medical practitioners were losing prestige in the localities where they practised by being members of such boards. Men also arrived before the medical boards with rancid oil, condensed milk, or some other substance running from their ears in order to deceive the medical officers. Everything, in fact, was being done to make the work of the medical boards as difficult as possible.

But whatever else may have roused popular feeling against the manner in which the Military Service Acts were being applied by the recruiting authorities and medical boards, the method of categorizing recruits, and the impossibility of maintaining a definite standard for each category were probably the chief cause of discontent. Medical boards were required to classify a man, not in accordance with his actual state of health at the time of his examination, but in the category of fitness which he was likely to attain after four months' military training. It was hardly possible to expect medical boards or their individual members to be in agreement on this point in each case. In fact, "the doctrine of disagreement of doctors applied to disagreement of boards." Then, again, the policy which the boards were instructed to follow was that if a man were fit to earn his living as a civilian he was also fit to do some form of work in military service. There was probably no greater source of trouble than the interpretation placed by medical boards on this.

These difficulties in arriving at a uniform standard of classification are exemplified by the result of the re-categorization of 3,449 men who appeared on appeal before the special medical board in London between October, 1916, and 4th July, 1917. The category of 189 of them was raised, 1,202 were confirmed in the category in which they were placed by the recruiting medical boards, 1,958 were lowered, and 336 rejected as unfit. As many as 135 of the 336 rejected had been placed by the recruiting medical boards in Category A. The majority of the rejections were for nervous disorders, tuberculosis and heart disease. These facts, and similar facts produced by the appeal tribunals, led to the popular impression that an immense

amount of hasty and ill-considered classification of men for the army was going on. On the other hand, the Director of Recruiting, Sir Auckland Geddes, tested the margin of error in classification in a sample case, and found that it did not amount to more than 0·5 per cent. of the total number of recruits classified.

All these points and many others led to a debate on the Army estimates on the 21st June, 1917, and subsequent days, in which attention was drawn to the alleged scandals in connection with the medical re-examination of discharged and rejected men. It was stated that " the appeal tribunals had long since lost any faith not only in the competence, but in the good faith of some of the medical boards." It was pointed out in reply that the medical boards were not so much to blame ; that medicine was not an exact science, and that results which they were not capable of affording were being asked for in vain from medical examinations. Further, many men who had been rejected under the old system and were being called up for re-examination under the Military Service (Review of Exceptions) Act had been previously rejected in primary military examinations without being brought before a medical officer, or were rejected by certain selected corps to which they were posted, or had obtained rejection by fraud, bribery, impersonation, doping, or chemical and bacterial maiming ; so much so, that in one city alone, as many as 25 per cent. of rejected men proved on re-examination to be Category A men. The men who came up in these circumstances were often very critical in speaking of their medical examinations.

In order to restore public confidence a select committee of the House of Commons was appointed on the 26th June, 1917, to enquire and report on the instructions issued by the War Office with regard to the administration of the Military Service (Review of Exceptions) Act, 1917, and on the method, conduct and general administration of the medical examinations under the Military Service Acts.

The committee commenced its sessions on the 27th June, under the chairmanship of Mr. Shortt, and examined, amongst others the Director of Recruiting, the Director-General of the Army Medical Service, the Deputy Directors of Medical Services of different Commands, the Inspectors of medical boards, certain members of recruiting medical boards and special medical appeal boards, the G.O.C.-in-Chief of the Northern Command, members of tribunals and military tribunals and others, as well as the Secretary of State and Under-Secretary of State for War. Before completing the examination of all of these witnesses, the committee sub-

mitted a special report on the 2nd August, 1917, recommending that the whole organization of recruiting medical boards and of the medical examinations and re-examinations should be removed from the War Office and placed under civilian control* at the earliest possible moment, and not delayed until the full report was presented.†

In consequence of this report the system of medical examination of recruits was radically changed. The Ministry of National Service was reconstituted on the 31st October, 1917. Sir Auckland Geddes, the Director of Recruiting, was transferred to it as its head, and Colonel Galloway reverted to civil employment and joined the Ministry as its Chief Commissioner of Medical Services. A medical advisory board was also established in connection with the medical department of the Ministry of National Service. It consisted of representative medical men of high standing from England, Scotland and Wales, to advise the Chief Commissioner in matters of technical medical concern, such as the disabilities which should determine the grading of men.‡

The whole system of recruiting was then reorganized on a civilian basis. The country was divided into ten recruiting regions, which, with the exception of Scotland, did not coincide with the areas of the military commands. A director of recruiting and a commissioner of medical services were appointed amongst other officials to each region for the purpose of collecting men from civil life, sending them before the medical boards, and arranging and controlling medical boards generally. The regions were each divided into a considerable number of areas, with a deputy commissioner of medical services in each area who presided at all sessions of medical boards in the area.§ The medical boards were formed of the chairman and four members obtained as required from a panel of the local civil medical practitioners, who gave part time service in rotation

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* This was the view held in 1916 by the Adjutant-General, Sir Nevil Macready, who recorded his opinion then that the collection of men for military service should be a civil function under the Home Office or Local Government Board, and that the War Office should only control their reception. The War Office had frequently pressed for a co-ordinating department but this was refused by the War Cabinet.

† The full report was not submitted till the following year, the last session of the select committee being held on the 31st January, 1918.

‡ The medical departments of the Admiralty, War Office, Local Government Board, Scottish Office, National Health Insurance Commissioners, and Ministry of Pensions were notified of all meetings of the Advisory Board and could send representatives to them.

§ Areas corresponded roughly with county boundaries, but in large cities, such as Manchester, there were more than one area with a deputy commissioner in each.

either at a forenoon or afternoon session.* In addition, a number of travelling medical boards were established for the convenience of certain large industrial concerns such as collieries. They were supplied with portable equipment and travelled from place to place as required.† The whole system was entirely civil, and, although many of the presidents and members of the old recruiting medical boards constituted the new boards, none of them were army medical officers on the active list. Those on the retired list who had been re-employed by the military authorities reverted to civil employment.

The special medical appeal boards ceased to exist on the 31st October, 1917, and were replaced by medical assessors appointed to the appeal tribunals of the Local Government Board. The assessors, who were physicians or surgeons of high standing in the locality where the appeal tribunals sat, served in a purely civil capacity and formed groups of three medical men each. There were eleven such groups in England and Wales and three in Scotland, thus extending very widely the facilities for the re-examination of men who appealed to the tribunals for exemption or alteration of their classification.

The Ministry of National Service, in taking over recruiting for the army, abolished, so far as the medical boards were concerned, the classification of recruits into categories of fitness for different kinds of military service. Instead, recruits were classified in four numbered grades according to their physical condition.

Grade I included men who had attained the normal standard of health and strength, and were capable of enduring the amount of physical exertion suitable to their age, and were free from serious organic disease or deformity. Men in this grade were generally men fit for general service, and when handed over to the military authorities would be placed in Category A of the military administrative classification.

Grade II included those who were able to stand a fair amount of physical strain and likely to improve under training. They were men with fair sight and hearing,

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* In London and in some other localities it was more convenient to have the boards formed of medical practitioners who gave their whole time to the duties. The number of these National Service Medical Boards was 97 in November, 1917, by June, 1918, there were 209. They examined 80,000 men in the first month of their constitution, the number gradually increasing to 285,361 in April, 1918, 456,599 in May, and 475,416 in June. The number examined then gradually decreased. The total numbers examined between November, 1917, and October, 1918, inclusive were 2,425,184.

† Similar recruiting travelling medical boards were used by the military authorities previously.

of average muscular development, and able, when trained, to march 6 miles with ease. They would be placed in Category Bi or Ci by the military authorities.

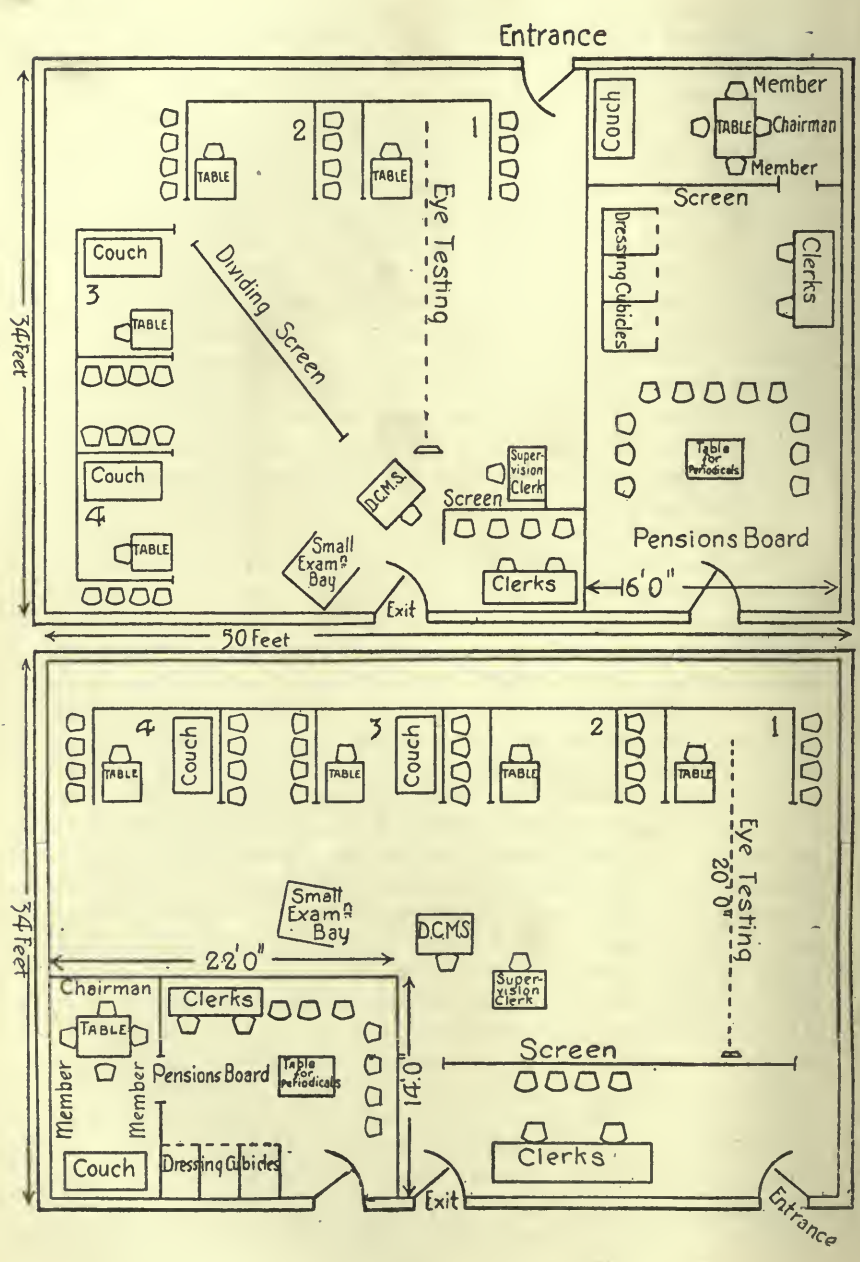
Grade III included men not likely to be suitable to undergo military training for combatant service. They would be men suffering from defects or disabilities in varying degrees. The grade was intended to cover all men fit for auxiliary military service, either in the form of labour or sedentary occupation, the latter being those who for any reason were unable to walk a distance of 5 miles. It included the older men who were fit for work in camps rather than with moving troops. Men so graded were suitable for categories Bii and Cii, Biii and Ciii, when called up for military service.

Grade IV included all men who were clearly found to be permanently and totally unfit for any form of military service by unanimous decision of the medical board or the medical assessors of an appeal tribunal. The grade was equivalent to category E of the old recruiting medical boards.

Recruits were handed over to the military authorities as graded by the National Service medical boards, and these gradings could not be altered. But they were placed in the military categories which corresponded with the grades and posted to units accordingly. Subsequent lowering of the category could only be carried out by the travelling medical boards, which exercised their functions as before. But recruit distribution battalions* were formed for the reception of recruits handed over in Grade III. The functions of these battalions were to post to units, or otherwise dispose of, all Bii and Biii recruits, and to put through a course of physical training those belonging to these categories who were likely to attain to Category Bi within three months, when they were posted according to results. A posting board, composed of a field officer belonging to the battalion, the medical officer and a posting officer, carried out the posting of these recruits.

Regional commissioners of medical services also provided pensions medical boards consisting of a chairman and two members. These boards were intended to sit in the same place as the recruiting medical boards, but with the accommodation arranged in such a manner as to avoid pensioners mixing with recruits. Standard accommodation for a recruiting and pensions board, as arranged by the Ministry of National Service, is shown in the following alternative plans.

* Formed in November, 1917, one in each command.


Entrance
Member
Couch
TABLE
Chairman
Member
Screen
2
1
TABLE
TABLE
Eye Testing
Dressing Cubicles
Clerks
Couch
3
Dividing Screen
TABLE
Couch
4
TABLE
D.C.M.S.
Super-vision Clerk
Screen
Table for Periodicals
Pensions Board
Small Exam.n Bay
Clerks
16'0"
Exit
34 Feet
50 Feet
4
3
2
1
Couch
Couch
TABLE
TABLE
TABLE
TABLE
Eye Testing
20'0"
Small Exam.n Bay
D.C.M.S.
22'0"
Chairman
Clerks
Super-vision Clerk
TABLE
Screen
Member
Pensions Board
Table for Periodicals
14'0"
Member
Couch
Dressing Cubicles
Clerks
Exit
Entrance
34 Feet

In July, 1917, the Military Service (Convention with Allied States) Act was passed, and conventions were concluded with Russia the same month and with France on the 5th October, 1917. They were made applicable by Orders in Council in August and September following, and provided for the examination as to fitness for military service of British subjects resident in those countries. There is no record of examinations in Russia, but, in France, British residents were at first examined by military medical boards, and it was arranged that those passed fit for service should be examined by a National Service medical board at Southampton, on their arrival in England. This arrangement proved unsatisfactory, in consequence of the wide divergence of opinion between the military and civil boards. The Ministry of National Service thereupon undertook to provide a civilian medical board to examine British subjects in Paris; and this board subsequently became a travelling medical board, which visited other localities in France where British subjects resided. A similar board was formed in Dublin in July, 1918, to examine Englishmen resident in Ireland. These boards completed their work between July and September, 1918.

With the transfer of the medical examination of recruits to the National Service Ministry the work of the Army Medical Service in respect to this duty came to an end; but military and National Service medical boards came into association with one another in connection with the discharge of soldiers from the army. In order to centralize the method of discharging men, especially men of low category, who had accumulated in large numbers in the army, a permanent discharge centre was established in each command in December, 1917, where discharges or transfers of soldiers to the reserve, other than patients in hospital who were discharged by hospital invaliding medical boards as permanently unfit, were carried out.* But all men sent to the discharge centre from their units had to be brought before a military medical board† to determine whether they were physically fit or unfit for further service;‡

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* Previous to this similar cases were transferred to a labour unit in each command and discharged from there.

† In July, 1917, a standing invaliding board was appointed to each labour centre for the purpose of classifying or discharging men sent to it from units by commanding officers as unfit for further service. The discharge centre boards replaced these. The men sent to the standing invaliding boards did not come before travelling medical boards.

‡ Large numbers of men, such as miners and shipbuilders, were sent to the discharge centre for discharge from the army to take up civil work of national importance. They were not necessarily unfit for military service and might belong to the highest category.

and civilian medical boards established by the National Service Ministry had then to determine whether the soldier had or had not been impaired in health since his entry into the army and to place him in the civil grade for which they considered him fit. The establishment of both military and civil boards at the discharge centre resulted in duplication of work and waste of medical personnel, and in August, 1918, it was decided by the Army Council in agreement with the Ministry of Pensions and the Ministry of National Service to establish only one type of board at each discharge centre. It was to be a civilian medical board of two medical practitioners from the National Service panel with one military medical officer attached, under a deputy commissioner of medical services as chairman. Any disagreement between the civilian and military members was to be referred to an appeal board.

The systems of medical examination of recruits established after the passing of the Military Services Acts may be said thus to have effected for the first time in the history of Great Britain an enquiry into the physical health of the whole male population of military ages throughout the country, and new and important facts regarding the physical standards of the nation's manhood were brought to light. As regards the military medical service, the importance of dentistry in the army and the significance of cardiac symptoms were strongly emphasized.

Very many recruits appeared for voluntary enlistment at the beginning of the war who were being rejected on account of defective teeth, and who with suitable dental treatment would have been accepted for general service. At first there was a tendency to relax the dental standard, but instructions on this point had to be cancelled, owing to the bad state of teeth of men sent as drafts to units in the field. The British Dental Association, the Scottish Dentists' Association, dental surgeons and dental institutions throughout the country volunteered to treat gratuitously the men rejected on account of such dental defects as could be rectified in order to render them fit for service, and in this way materially assisted recruiting. Early in the war arrangements were made by the War Office with the British Dental Association by which a medical officer examining recruits was empowered to send men whom he considered could be made fit by dental treatment to dental surgeons and dental institutions in the neighbourhood of the recruiting office. In November, 1914, commands were also asked to prepare a list of dentists of high standing who would be willing to act as honorary consultants in dental surgery to the military hospitals. Instructions were issued in the same

month to the effect that no man was to be discharged on account of decay or loss of many teeth if by dental treatment he could be rendered fit to remain in the service; full advantage being taken of the facilities placed at the disposal of commands for gratuitous treatment. Later on, in January, 1915, men with defective teeth might be attested if otherwise fit for general service and willing to undergo dental treatment; and in February of the same year a recruit might be passed as fit "subject to dental treatment," which was then to be carried out when he joined his depôt.

The dental work which was thus introduced into the army led at a very early period of the war to the recognition of dentistry as a special branch of army medical organization and of special importance in connection with recruiting. There was at first a slow but steady increase in the number of dentists appointed to special commissions both for service at home and overseas. Twelve were sent to France in November, 1914, and the number was increased to twenty in December, but, at home, dental treatment remained in the hands of civil practitioners, until towards the end of January, 1915, when a few commissioned dentists were posted to home stations for the treatment of recruits and serving soldiers, but they were so few that practically the whole of the work was still carried out by civil dentists, many of whom were unqualified practitioners whose work there were no means of effectively controlling. The result of this was that many men had their teeth extracted unnecessarily and were held back from drafts until their mouths were ready for dentures. Other difficulties arose in connection with the refusal of men, who had been passed into the army, to undergo dental treatment, and the necessity of appointing inspecting dental officers was forced on the administrative medical services in August, 1915, with the result that in September of that year commands were authorized to select a suitable dental officer, from amongst those serving in the command, who should be on the staff of the D.D.M.S. and advise on all dental matters. The shortage of commissioned dental officers, however, impeded their work to a considerable extent; and when the Military Service Acts of 1916 came into force a large increase in the number of military dental surgeons became necessary. The numbers gradually increased to 463 in December, 1916, and continued to increase year by year till it reached a maximum of 849 at the time of the Armistice in November, 1918.*

During 1916 and 1917, notwithstanding these efforts at establishing a high standard of dental treatment amongst recruits,

* In February, 1915, the number was 36, in May, 1915, 57, in August, 1915, 150, and 300 in August, 1916.

administrative difficulties arose in many directions, and it was with a view to advising and co-ordinating the work throughout the United Kingdom that an inspecting dental officer was appointed to the staff of the Director-General of the Army Medical Service at the War Office in March, 1918. Lieut.-Colonel Helliwell, after taking up the appointment and inspecting the dental work in the commands, submitted a long report to the War Office in May of that year. He stated that the dental treatment at home was quite inadequate and that only a very small proportion of the men requiring dental treatment were being made dentally fit for service abroad.* He estimated that the number of men at home liable to service overseas who required dental treatment each month was 136,150, and that the number of dental surgeons required was 667, exclusive of 100 required for the Royal Air Force. The number of dentists in the home commands was at that time 282, and, in consequence of this report, the number was increased in October to 690. Lieut.-Colonel Helliwell's report contained many other details and suggestions for army dental organization and treatment. They were eventually embodied in an Army Council Instruction of October, 1918. The dental condition of the drafts for overseas steadily improved as a result of this evolution of the dental services, and, as already noted, dentistry has now become recognized as an integral part of the military medical organization.

Another result of the extension of recruiting to all classes of the community was to introduce into the army men whose vision was lower than the standard accepted previous to the war, and with this came an organization for the provision of spectacles through ophthalmic centres. Thus in February, 1917, the vision of a man passed into Category A, which formerly had to be one-fourth of normal vision in both eyes without glasses, was only required to reach that standard in one eye, provided the vision in the other eye could be corrected to one-half normal vision with the aid of glasses. But the issue of spectacles was authorized long before this in an instruction of March, 1915, in which every man proceeding overseas, whose eyesight would be improved by glasses, was to be provided with two pairs of spectacles; an instruction which was repeated in November of the same year to apply to every soldier liable for active service who was in need of spectacles.

The significance of cardiac symptoms in connection with the rejection or otherwise of men appearing before medical examiners of recruits, recruiting medical boards and special medical

* 70 per cent. of the recruits and men at home were estimated to be in need of dental treatment.

appeal boards became a matter of much importance. Many men had been and were being rejected on account of supposed heart disease, who, in accordance with the teaching of Sir James Mackenzie, the recognized authority on the subject, were perfectly fit. At the request of the War Office he drew up, in September, 1915, a memorandum, for the guidance of medical examiners of recruits, dealing with the significance of abnormal signs in the recruit's heart, such as were physiological in origin and indicative of neither disease nor impairment. It is difficult to ascertain the extent of the influence which this memorandum exercised on the rejection of recruits; but Sir James Mackenzie, in his evidence before the select committee of the House of Commons referred to above, does not appear to have been impressed with the manner in which it operated on the minds of medical examiners.

But whatever may have been their permanent effect on the army medical service, the general results of the medical examination of recruits under the Military Service Acts had a far-reaching effect. The facts elicited concerning the health of the civil population formed a human document which inspired to a great extent the organization subsequently formed after peace was declared to deal with the problems of public health in the United Kingdom.

CHAPTER VIII

THE RECRUITING AND TRAINING OF PERSONNEL FOR THE MEDICAL SERVICES

THE recruiting of personnel for the Army Medical Service did not differ in its general aspects from the recruiting for the army generally, except in the case of officers and nursing services, for which special arrangements were made; but, owing to the demands for men as reinforcements to the combatant ranks, the recruiting for the Royal Army Medical Corps was restricted not only in numbers but also in categories as the war went on, and had to be supplemented in hospital services to a great extent by women.

Active recruiting was carried on, however, without restriction until the 4th November, 1914, when 26,336 had voluntarily enlisted in the Royal Army Medical Corps.* Recruiting for the Corps was then stopped, but it was resumed between 8th January and 10th March, 1915, and again for a few days at the end of April and beginning of May of the same year. After the 3rd May, 1915, general recruiting for the Corps ceased altogether except for a short period between the 24th October and 4th November, 1915, during which time 8,639 recruits were obtained. Enlistment in the R.A.M.C., however, was permitted to men with special qualifications, such as dispensers, laboratory attendants, nurses, masseurs, mental and operating room attendants, sanitary inspectors, splint makers, electro mechanics, and men holding first aid and nursing certificates. By the 31st December, 1915, 66,139 men had been obtained for the R.A.M.C., including the home hospital reserve, but exclusive of men in the Territorial Force.

In the years of the war subsequent to 1915 enlistment into the R.A.M.C. was determined by the Military Service Acts. Although 6,700 recruits of the highest national service group were posted to the R.A.M.C. in the summer of 1918, men allotted to it, as is shown in the following tables, were chiefly men of a category of physical fitness lower than that required for combatant units, with the result that men of the highest

* The sources from which recruits were obtained were from amongst men whose occupation in civil life was that of clerks, schoolmasters, and students of all descriptions, in addition to men with special qualifications and members of the St. John Ambulance Brigade. Some clergymen were also eager to enlist in the R.A.M.C. when debarred by episcopal authority from joining the combatant ranks at the beginning of the war.

category already in the Corps were gradually drafted into the field medical units; their places in the medical units on the lines of communication and at home being taken by new recruits of lower categories, and by invalids from overseas discharged from hospital as unfit for general service, or by women.

Posting of Recruits to the R.A.M.C. after the Military Service Acts came into Force.

Month.	Military Categories.							Total.
	A.	Bi.	Bii.	Biii.	Ci.	Cii.	Ciii.	
1916.								
January	100*	—	—	—	—	—	—	100
February ..	—	—	—	—	—	—	—	—
March	—	—	—	—	—	—	—	—
April	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—
August	—	—	—	—	—	—	—	—
September ..	—	—	3,500	—	—	—	—	3,500
October	—	—	3,500	—	—	—	—	3,500
November ..	—	—	1,000	—	—	—	—	1,000
December ..	—	—	—	—	—	—	—	—
1917.								
January	—	—	4,000	—	—	—	—	4,000
February ..	—	—	4,000	—	—	—	—	4,000
March	—	—	1,550	—	—	—	—	1,550
April	—	1,050	4,000	—	5,450	—	—	10,500
May	—	—	2,400	—	2,600	—	—	5,000
June	—	500	1,500	—	—	—	—	2,000
July	—	—	4,000	—	—	—	—	4,000
August	—	250	3,500	—	250	—	—	4,000
September ..	—	500	1,000	—	500	—	—	2,000
October	—	—	—	—	—	—	—	—
November ..	—	500	1,500	—	—	—	—	2,000
December ..	—	—	—	—	—	—	—	—

* Category 1 of A.C.I. 212 dated 26/1/16.

Month.	National Service Groups.			Total.
	I	II	III	
1918.				
January	—	—	—	—
February	—	500	500	1,000
March	—	1,000	1,000	2,000
April	—	—	—	—
May	3,200	1,000	700	4,900
June	2,500	500	250	3,250
July	1,000	—	—	1,000
August	—	—	—	—
September	—	—	—	—
October	—	—	—	—
November	—	—	—	—
December	—	—	—	—

Summary.

1916.		1917.		1918.	
Group.	No.	Group.	No.	Group.	No.
A	100	A	—	I	6,700
Bi	—	Bi	2,800	II	3,000
Bii	8,000	Bii	27,450	III	2,450
Biii	—	Biii	—	—	—
Ci	—	Ci	8,800	—	—
Cii	—	Cii	—	—	—
Ciii	—	Ciii	—	—	—
	8,100		39,050		12,150

The shortage of men of high category for the R.A.M.C. in the field began to be felt, however, in 1915, for in July of that year provision was made for the employment in hospitals at home of men of the regular and territorial force, who were permanently unfit for service abroad, in order to release men of the R.A.M.C. for medical units overseas.

This shortage of high category men was accentuated by an order issued on the 23rd March, 1915, by which a number of men of the R.A.M.C. were transferred to infantry battalions to meet demands for reinforcements to the expeditionary force. To replace them, members of the R.A.M.C.(T.F.) between the ages of 17 and 19, or 40 and 50, that is, the too young and the too old for field service, were authorized in May, 1915, for enlistment in the R.A.M.C. if suitable for work in general hospitals, and men between the ages of 19 and 39 serving in the R.A.M.C.(T.F.) general hospitals, were encouraged to re-enlist in the regular R.A.M.C., or take on an imperial service obligation. A shortage of men was also felt in the home hospital reserve employed in the military hospitals at home when the great expansion of hospital accommodation began. It was consequently arranged, in May, 1915, to distribute men of the home hospital reserve to new military hospitals as a nucleus establishment, and then complete the establishments of all hospitals by young recruits of the R.A.M.C.

In the case of war hospitals established in asylums and military hospitals in poor law infirmaries, the hospital personnel was obtained mainly from the civilian staff of these institutions.*

* Some confusion arose at first from the fact that these civilian staffs were being paid from two sources, and in October, 1915, attention had to be drawn to diversity of practice in this respect, pointing out that all permanent civilian staffs, whether granted temporary army rank or not, or paid at civilian, army, or special rates, were to be paid by the civilian authorities of the institution and not direct from army funds.

The employment of women in military hospitals at home in order to replace non-commissioned officers and men transferred to other medical units commenced in September, 1915. A committee composed of several representatives of civil organizations which were in a position to supply women for hospital duties was established by the Joint War Committee of the British Red Cross Society and Order of St. John. It was known as the Joint Voluntary Aid Detachment Committee, Devonshire House, and arrangements were made by the War Office by which all demands for women for general service in hospitals, as distinct from nursing services, were to be made to the chairman of this committee.* Women were registered as dispensers, clerks, cooks, and cleaners, at weekly rates of payment varying from 18*s.* 6*d.* for a cleaner to 35*s.* for a head cook or head clerk and 30*s.* for a dispenser, with allowances of £4 for dress. They were placed under the control of the matron when on duty in wards, and under the head cook when employed as kitchen staff.

The arrangements were modified in January, 1916, and women employed in military hospitals were then engaged either as "general service women," or as "labour staff." The former class included clerks, telephonists, untrained laboratory assistants, and storekeepers, with weekly wages from 20*s.* to 26*s.*; women with special technical qualifications such as dispensers, at 40*s.* to 45*s.* weekly;† cooks at £30 and £40 annually if resident head cooks, or 16*s.* to 18*s.* weekly if assistant cooks; trained laboratory assistants at 26*s.* to 30*s.* weekly; and head clerks with wages ranging from 26s. to 33s. weekly, or 33*s.* to 35*s.* in the case of a head clerk appointed as a general superintendent. The officer commanding a hospital at home applied for the general service class of women to the county directors of voluntary aid organizations, in order that women living in their homes in the vicinity of the hospital should be obtained if possible. Failing these, particulars of requirements were sent to the Joint V.A.D. Committee at Devonshire House. The labour staff consisted of women on unskilled or semi-skilled work such as cleaners, scrubbers, kitchenmaids and others employed on manual labour. They were engaged locally, without reference to the voluntary aid organizations, by the officer in charge of the hospital or matron at 18*s.* to 20*s.* weekly without food or lodging.

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* Women cooks were, however, appointed to convalescent hospitals through the Commandant of the Women's Legion, Cookery Section, an organization not represented on the Devonshire House Committee.

† Dispensers with less qualifications received 28*s.* to 30*s.* weekly.

In April, 1916, the scale of subordinate personnel was regulated, so as to consist of two voluntary aid detachment nursing members,* two women cleaners and one male orderly in a ward of 50 to 70 beds under a nursing sister.

In June, 1916, general duty and nursing orderlies were withdrawn from military hospitals at home, and members of the nursing section of voluntary aid detachments were then required to perform the same duties as probationer nurses in civil hospitals, such as sweeping and dusting wards, cleaning of ward tables, baths, sinks and ward utensils, sorting of linen, and so on, in addition to the nursing duties which they were considered qualified to perform.

In August, 1917, further instructions were issued regarding the employment of women in the general service section of the voluntary aid detachments. No general service or labour woman was to be employed unless a soldier was relieved for other purposes; four women clerks being considered the equivalent of three soldier clerks. The employment of general service and labour women was then greatly extended and applied to medical units overseas. The nature of their employment was also altered to include not only dispensers, clerks, cooks and storekeepers, but also waitresses, pantrymaids, optician assistants, dental assistants, motor transport drivers, mechanics, and washers, with commandants, unit superintendents, general service superintendents, and quartermasters. In other words, the general scheme of employment of women in hospitals at home and overseas, other than for nursing duties, took the place of the Women's Army Auxiliary Corps† so far as the medical services were concerned.

The recruiting of general service V.A.D. women was continued under this scheme until December, 1918, when it ceased. The employment of masseuses, however, in the medical services was outside the V.A.D.(G.S.) organization, and was initiated by Mr. and Mrs. Almeric Paget in August, 1914, who established a corps of 50 skilled masseuses, under the personal control and supervision of Mr. Almeric Paget, Dr. Barrie Lambert, and the Hon. Miss Essex French. It was called the Almeric Paget Massage Corps, and commenced working in territorial force general hospitals in September, 1914, free of charge to

* The general service women became distinguished from the V.A.D. nursing sections by the letters V.A.D.(G.S.). Members of the V.A.D. (Nursing Section) had already been taken into employment in the military hospitals early in 1915. They were appointed by the War Office and not locally. It was arranged then that each trained nurse could be replaced by two nursing members of a V.A.D.

† The W.A.A.C. was officially authorized in July, 1917; none of its members were appointed to replace men of the R.A.M.C.

the public. The increasing demand for skilled masseurs and masseuses in military hospitals led to the enrolment of large numbers in this Massage Corps, and in September, 1915, the War Office arranged that it should in future be the sole source from which masseuses should be supplied.* In December, 1916, it was given the title of the Almeric Paget Military Massage Corps, and in May, 1917, it became a service paid by the War Office for duty in military hospitals, convalescent hospitals and command depôts. In July, 1917, the employment of its members was authorized in hospitals overseas. The rate of pay for a masseuse was fixed at £2 10*s.* weekly without accommodation, the head masseuse receiving £3 if ten or more were employed in any one hospital.†

These arrangements continued until January, 1919, when a definite military massage service was organized, with its headquarters at the War Office. The members were placed in two categories, A and B, according to qualifications. In each category there were three classes—mobile, immobile, and part-time. The grades were head masseur or masseuse, senior masseur or masseuse, and masseur or masseuse. They were prescribed a uniform with the letters M.M.S. in white on a blue ground on the hatband, and grade badges on the shoulder-straps. Altogether 3,388 masseurs and masseuses were enrolled during the war, and 2,000 were at work on the day the Armistice was signed. Approximately, the numbers employed after the Almeric Paget Massage Corps became the recognized source of supplying massage personnel for military service was, in January of each year, 900 in 1916, 1,200 in 1917, 1,500 in 1918, 2,000 in 1919. During 1919 the numbers were necessarily much reduced, and at the end of the year the number was 600.

Recruiting for the R.A.M.C. of the Territorial Force was carried out by the Territorial Force County Associations on a divisional basis during the period of voluntary enlistment; men being appointed to second and third line field medical units and casualty clearing stations as these units were raised. It was not within the power of the Director-General, Army Medical Service, to control their movements without the consent of the Territorial Force directorate until November, 1915, when the control of the medical services of the Territorial Force was transferred to him. After the Military Service Acts

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* From June, 1917, onwards masseuses might, however, be employed locally for out-patients, any expenses incurred being recovered from the Ministry of Pensions.

† In an orthopædic hospital or sections of hospitals when 25 or more masseuses were employed the head masseuse received £3 10*s.* weekly.

had been passed, officers and men under 41 years of age became available for posting where required, and existing Territorial Force medical units lost their territorial designations and were given consecutive numbers as R.A.M.C. units. The records of the Territorial Force R.A.M.C. were transferred from the R.A.M.C. T.F. depôt units to the office of the regular R.A.M.C. records in June, 1917, and the system of regimental numbering then became a corps instead of a unit numbering. Recruiting for the R.A.M.C. T.F. units, as individual units, thus ceased, and was merged in the general arrangements for recruiting the R.A.M.C. as a whole. The numerous R.A.M.C. T.F. depôts were abandoned at the same time and one central depôt formed at Blackpool. The sanitary sections, however, continued to be recruited through the London Sanitary Companies of the Territorial Force, whose headquarters were at the Duke of York's School in London.

Recruiting from the civil medical profession to fill the officer ranks of the Army Medical Service presented many difficulties, chiefly in connection with the management of civil practices and the obligations of civil medical practitioners serving under the National Health Insurance Commissioners and other public bodies. Reference has already been made to the ready response of the civil medical practitioners to accept temporary commissions in the R.A.M.C. on the outbreak of war. But the conflicting demands of the civil and military medical services soon led to attempts to regulate the flow of medical men from civil to military life. The first step in this direction was taken by Dr. Hamilton, of Hawick, as chairman of the Scottish Committee of the British Medical Association. He called a meeting of its members on the 12th August, 1914, to consider arrangements for continuing the civil work and conserving the interests of some 300 medical practitioners in Scotland who had mobilized as Territorial Force medical officers on the declaration of war. A Scottish Medical Service Emergency Committee was then formed, its purpose being to provide medical officers for the army with due regard to the needs of the civil population and the personal position of individual doctors, and to look after their interests during their absence on military service.* This was followed by a similar committee being formed in London by the metropolitan counties branch of the British Medical Association to deal with civil medical work in the metropolitan area. The British Medical Association then decided to extend to the United Kingdom as a whole measures for adjusting the recruiting of medical officers to

* It was estimated that a sixth of the medical profession in Scotland had taken commissions in the R.A.M.C. by February, 1915.

the needs of the civil community, and a committee composed of the chairman of its standing committees was formed for this purpose. Its first meeting was held on the 5th February, 1915.

In March, 1915, the Director-General of the Army Medical Service announced that 2,000 medical officers were required for the army. This demand caused considerable consternation amongst the members of the medical profession generally, and led to a committee of reference of the Royal Colleges of Physicians and Surgeons being formed to consider to what extent staffs in teaching schools and hospitals could be reduced in the metropolitan area. A Dublin War Emergency Committee was also established in May, 1915.*

In July, 1915, these committees were amalgamated as a War Emergency Committee for England, Wales, and Ireland, which became known as the " Central Medical War Committee " in the following October. The object of this committee, according to its terms of reference, was " to organize the medical profession in such a way as to enable the Government to use every medical practitioner fit to serve the country in such a manner as to turn his qualification to the best possible use " ; and " to deal with all matters affecting the medical profession arising in connection with the war." Representatives of the Scottish and Irish committees were nominated to serve on the central committee, which kept in close touch with the medical department at the War Office. Local medical war committees were also formed throughout the country by branches of the British Medical Association.

When Lord Derby introduced his group scheme of enlistment, in November, 1915, he handed over the whole of the recruiting for officers of the R.A.M.C. to this Central Medical War Committee for England and Wales, to the Scottish War Emergency Committee for Scotland, and to the Irish Medical War Committee for Ireland. The Central Medical War Committee then arranged to enrol the medical practitioners in England and Wales in twelve groups, based on varying conditions of local civil requirements, security of practices and appointments, age, and family obligations. Under this scheme 5,253 medical practitioners enrolled voluntarily for service if called up. When compulsory military service came into force in January, 1916, the War Office announced that no medical practitioner under 45 years of age would be employed as an officer of the R.A.M.C. unless he undertook general service, and that none over 55 would be accepted for home service. The

* Afterwards it became the Irish Medical War Committee.

Scottish Medical War Emergency Committee then put forward a scheme for recruiting medical officers in three groups: those under 45 to be commissioned for general service as lieutenants R.A.M.C., those between that age and 55 as lieutenants for home service, locum tenens, or part-time military and civil work, and those over 55 for part-time work and locum tenens work.

In April, 1916, the War Office officially recognized and relied on the Central Medical War Committee and the corresponding committees in Scotland and Ireland as professional committees for dealing with claims of qualified medical practitioners for exemption from military service under the Military Service Acts; and, under the regulations of the Act they were entitled to appoint and recognize local professional committees to act in a similar capacity. They were eventually recognized as tribunals to which medical practitioners might appeal without being required to appear before the local tribunals appointed by the Local Government Board.

In December, 1916, the professional committees decided to mobilize the whole medical profession for such service as each member of it was competent to give; but some disturbance of the relations between the committees and the War Office was caused by the latter sending calling-up notices in April, 1917, to every medical practitioner in the country under 41 years of age without reference to the professional committees. The Central Medical War Committee protested against this action and the Secretary of State for War then agreed that, according to the numbers required from time to time by the Director-General of the Army Medical Service, the professional committees alone should call up medical men for service.

By the first of January, 1917, more than half of the medical profession had been called up for military service. There were then 12,363 medical officers in the army, the number in civil practice being somewhat short of this.

The recruiting of medical officers for military service thus gradually became a conflict of interests between the military and civilian requirements, which the professional committees endeavoured to adjust. Every effort had been made by the military authorities to relieve the situation. Medical students who had taken commissions or had enlisted in the ranks while in their fourth or fifth year of study were released from military service in September, 1915, in order to resume their studies, obtain their medical qualifications, and then join the R.A.M.C. as commissioned officers. Several qualified men had already taken commissions in combatant units of the new armies or

territorial force. In 1917 orders were issued for their transfer to the R.A.M.C., an order that was not altogether popular with officers who had been serving and fighting with their units up till then. The establishments of medical officers in field ambulances, general hospitals and other units were cut down to a minimum.

The shortage of qualified medical men of ages suitable for commissions in the R.A.M.C., especially of younger men for service with regimental and field medical units, however, became more and more acute as the war went on. By the 1st January, 1918, it was estimated that the number left in civil practice was only 11,482 as compared with 12,720 in military service. The situation was immensely relieved when the United States of America declared war against Germany. Unofficial correspondence had taken place between the Director-General of the Army Medical Service and the Surgeon-General of the United States Medical Service, and, as a result, in order to act as a liaison between the medical services of the United States and the British Army, Colonel T. H. J. C. Goodwin was selected to proceed to Washington and place himself in touch with Surgeon-General Gorgas, the head of the medical service at the War Department there. Colonel Goodwin arrived in Washington on the 25th April, 1917, and submitted a scheme for the assistance which the United States might give to the British as regards medical and nursing personnel. Three days later, on the 28th April, after an interview with the War Secretary, he obtained sanction for the immediate despatch to England of six base hospitals, complete in medical and nursing personnel, and 112 additional medical officers, and arranged for the despatch at a later date of further contingents of medical officers and nurses. Early in May he began a series of instructional lectures at the Army Medical School, Washington, at the War College, and at other places. He also made tours of inspection and gave instructional lectures at various camps and cities throughout the United States, as well as attending numerous meetings of medical and surgical societies.

The promptness and cordiality with which the United States Army authorities met in this way the requests of the British in connection with the medical services cannot be too strongly emphasized, or too warmly appreciated. It was agreed that the medical officers lent to the British Army should be placed entirely at the disposal of the British authorities, but that the United States Government would continue to pay them at its rate of pay and also provide their personal outfit.

The dates of arrival and composition of these general hospitals were as follows :—

Date of arrival.	Unit.	Medical Officers.	Dental Surgeons	Chaplains	Quarter masters.	Rank and File.	Nurses
18/5/17	No. 4	22	3	—	1	156	69
23/5/17	No. 5	24	2	1	1	154	68
23/5/17	No. 2	23	2	—	1	154	71
28/5/17	No. 21	24	2	1	1	150	65
28/5/17	No. 10	23	2	1	1	156	68
3/6/17	No. 12	25	2	1	1	153	64

They landed complete at Liverpool, except No. 12, which disembarked at Falmouth. The majority of the officers and all the nurses were at once brought to London, and lodged in the Curzon Hotel as the guests of the British Government. The rank and file accompanied by a few officers were sent to the Royal Army Medical Corps Training Establishment at Blackpool, pending their departure for France.

In the meantime, arrangements had been made for a conducting party of officers and other ranks from each British unit in France, designated to receive them, to come over and conduct them to France. The units then embarked for France as follows :—

Name of Unit.	To France on	Posted to	Location.
No. 4 Unit	24/5/17	No. 9 General Hospital	Rouen.
No. 5 Unit*	30/5/17	No. 11 General Hospital	Dannes Camiers.
No. 2 Unit	30/5/17	No. 1 General Hospital	Etretat.
No. 21 Unit	9/6/17	No. 12 General Hospital	Rouen.
No. 10 Unit	9/6/17	No. 10 General Hospital	Tréport.
No. 12 Unit	11/6/17	No. 18 General Hospital	Dannes Camiers

* This unit was later transferred to No. 13 General Hospital at Boulogne.

In course of time, after the American personnel had become familiar with the administration of the British services, the British personnel was gradually withdrawn, and the U.S.A. officers assumed entire control, the registrar and quartermaster being then the only British officers left with the general hospitals to which the American units had been posted. The commanding officer and adjutant of each unit were regular officers of the United States Medical Corps. The remaining officers were members of the Medical Reserve Corps, United States Army.

The American units were found at first to be deficient in subordinate personnel as compared with the British establishments, but drafts arrived later, so that it was possible to relieve

nearly all of the Royal Army Medical Corps men employed in the general hospitals to which the American units were posted.

These American base hospital units were composed of officers selected from some of the best known medical schools in the United States, each school contributing the personnel of one unit. Thus:—

No. 4 Unit	came from	Cleveland University.
No. 5 Unit	,,	Harvard University.
No. 2 Unit	,,	Presbyterian Medical School.
No. 21 Unit	,,	St. Louis University.
No. 10 Unit	,,	Philadelphia University.
No. 12 Unit	,,	Chicago University,

and it was decided that each British general hospital should bear the name of the medical school of the American unit posted to it, while retaining its number as a British unit, thus —No. 9 General Hospital was known as No. 9 (Cleveland U.S.A.) General Hospital, and so on. They continued to act as British general hospitals until early in 1919, when they were gradually withdrawn to the United States.

In addition to the medical units, a party of 20 orthopædic surgeons arrived at Liverpool on the 28th May, 1917, under the charge of Major G. W. Ewing. After a short stay at the Curzon Hotel as the guests of the British Government, they were posted to the various orthopædic hospitals throughout the United Kingdom.

Major W. J. L. Lyster, of the regular United States Medical Corps, was attached to the medical directorate at the War Office for the purpose of acting as liaison officer. He was succeeded by Colonel M. A. De Laney, who was replaced later by Colonel A. M. Whaley. The latter officer continued to carry out the duties until June, 1919, when he returned to the United States of America.

Parties of officers of the Medical Reserve Corps, U.S.A., also began to arrive in England in May, 1917, and continued to do so until November, 1918. They were drafted to regimental and field medical units of the British Army. As the American army in France began to be organized many of the American medical officers were withdrawn from duty with the British service and re-posted to the American army for duty. They were replaced by new arrivals from America, and after a few months spent in the hospitals in the United Kingdom they were transferred to France and Italy. They were not sent to other theatres of war. Early in 1919 these officers were gradually withdrawn, until by June, 1919, none remained, but during the critical years of 1917 and 1918 the total number of officers lent to the British Forces

remained at a high figure and thus contributed in a large measure to the maintenance of the Royal Army Medical Corps services which were so severely tried during those years. The number of U.S.A. medical officers attached to British units other than base hospitals was 1,253. The U.S.A. personnel in base hospital units was 174 officers, 1,174 enlisted other ranks, and 735 nurses.

In addition to those attached to the base units, two large contingents of nurses consisting of about 100 each arrived from America on the 16th February and 1st June, 1918. The first party proceeded to France after a short stay in London and was distributed among the various British hospitals. The second party was accommodated at the Berners Hotel for about a week, and then was distributed to various hospitals throughout the United Kingdom. The members of it remained in England for several weeks doing duty with the Queen Alexandra's Imperial Military Nursing Service, but eventually they were all transferred to France.

But, notwithstanding these invaluable reinforcements, owing to the great and unforeseen casualties in the commissioned ranks of the R.A.M.C. and other causes the demands on the civil profession continued and threatened to drain the country of civil medical practitioners. Various public bodies were affected as well as established general and consulting practices. The National Insurance Commisssioners, the Local Government Board, the Board of Control, the medical schools, and large civil hospitals had claims on many of those who were liable to be called up for military service; and the Royal Navy and Air Force had also to be provided with medical officers. The task of the professional committees and of the Director-General of the Army Medical Service was far from easy or simple, and the calling up of medical men and their distribution in the army were bound to produce discontent in many quarters. Some of those who had taken contract commissions for one year returned to civil life with tales of having had little to do or being given work for which they were not fitted, or of not being given work for which they were specially qualified. It was not realized that, in its very essence, war meant for the medical services periods of overwhelming strain and strenuous effort, with periods of comparative rest and idleness; and that specialization in medical work was not feasible, at any rate in the areas of active fighting. But whatever may have been the true causes there was a widespread feeling amongst the medical profession at home and the general public that greater economies could be effected by the Director-General, and that the distribution of medical duties both at home and in the field was at fault. The matter was brought to a head at the beginning of

August, 1917, by the Central Medical War Committee informing the Secretary of State for War that, after a careful survey of the whole of England and Wales, they were of opinion that no more medical men could be called upon to take commissions in the R.A.M.C. without seriously endangering the supply of doctors for the treatment of the civil community, and that further depletion could only be effected on the responsibility of the Government after carefully comparing the military with the civil needs. This letter followed a letter from the Adjutant-General in France of 24th July, 1917, pointing out that there was a shortage of 328 medical officers at the beginning of the month, and that, to prevent a breakdown in the medical services in France, the despatch of reinforcements suitable for duty with the field armies was urgently required. A committee was consequently appointed by the Secretary of State for War on the 22nd August, 1917, to proceed at once to France for the purpose of enquiring into various matters connected with the personnel and administration of the Army Medical Services in that country, and on their return they were to carry out similar investigation in the United Kingdom.*

The committee went to France on the 1st September, returned to England on the 27th September, and submitted their report on the 20th December, 1917.† They were unable, however, to suggest measures practically possible for effecting economies, or for a better distribution of medical officers, which had not already been carried out or were in process of being carried out.

A similar investigation was not made in the United Kingdom by this committee, but when Sir John Goodwin became Director-General in 1918 a committee was specially appointed to consider the staffing of medical establishments in the United Kingdom in its relation to the numbers employed and their distribution.‡ They held ten meetings and made several recommendations, most of which were already in process of being carried out where practicable. But the committee attacked chiefly the system of staffing the territorial force general hospitals with *à la suite* officers of high local standing; and this adverse criticism was still further emphasized by the Ministry of National

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* Major-General Sir Francis Howard was appointed chairman, and other members were Sir F. Taylor, President of the Royal College of Physicians; Sir Rickman Godlee, President of the Royal College of Surgeons; Sir W. Watson Cheyne, M.P.; Lieut.-Colonel H. J. Stiles, F.R.C.S.; Dr. Charles Buttar (Central Medical War Committee); Dr. Norman Walker (Scottish Medical War Emergency Committee); with Dr. J. Christopherson as secretary.

† The report was not published.

‡ The Committee was constituted of Sir Berkeley Moynihan (Chairman), Sir Harold Stiles, Colonel Carless, Sir Gilbert Barling, and Sir James Galloway.

Service in a letter to the Secretary of State for War of the 1st August, 1918, in which it was stated that the *à la suite* system was an extravagant one from the point of view of medical administration. It was thought that the work of a territorial force general hospital could be performed more satisfactorily by a smaller staff of whole-time officers, and that a number of the *à la suite* officers might be made available for service in the R.A.M.C. overseas or as whole-time officers elsewhere. But the chief objection to the system appears to have been that it placed these officers in a position of unfair advantage over their colleagues in the profession, because they held a commission and, although doing in many instances very little military work, were in full enjoyment of their private practice and of army pay. Their position was, in fact, causing much feeling of discontentment in the profession both in and out of the army.

The original conception of the staffs of territorial force general hospitals on an *à la suite* basis had proved faulty at the very commencement of the war. It left out of consideration the requirements of pathological and clinical laboratories, radiology, anaesthetics, and the other specialized work of large hospitals, as well as the need of junior medical officers for orderly medical duties. These had consequently to be appointed early in the war, immediately after the general hospitals had opened for work. The system proved progressively unsatisfactory as the war went on. The *à la suite* officers, in fact, were part-time officers only, and had to devote much of their time to the work of large civil hospitals and medical schools as well as to their consulting practice.

The committee's report and the letter from the Ministry of National Service were considered by the Army Medical Advisory Board at the end of August, 1918. They recommended that the system should be maintained, but that a minimum of three hours* on duty daily within the hospital should be enforced on all *à la suite* officers, and that any officers surplus to requirements by this increased attendance should be demobilized. No further action, however, was necessary, as hostilities showed signs by this time of coming to an end and the demand for additional medical officers for the army had practically ceased.

When recruiting for the army generally was removed from the War Office in November, 1917, the Ministry of National Service became the intermediary between the Central Professional Committees and the Admiralty, the War Office, and the Air Force, and became responsible at the same time for the maintenance of adequate medical services for the civil population.

* In many instances the average daily attendance had been less than one hour.

The Ministry of National Service, however, continued the policy of not calling up for service or sanctioning a commission being granted to a civil medical practitioner without reference to the professional committee concerned. When demobilization of the medical services commenced, the return of medical officers to their civil practices was carried out through the same channels until the end of March, 1919, when they abruptly ceased to function on the immediate demobilization of 2,000 medical officers being ordered by the Secretary of State for War.

With regard to other ranks of the R.A.M.C., the total number enlisted between the 4th August, 1914, and the 11th November, 1918, was 154,374, of whom 48,429 were raised for the Territorial Force R.A.M.C.

The growth in the numbers of officers and men is shown in the following table of those on the effective strength of the R.A.M.C. in August of each year up to the time of the Armistice.

Date.	Officers.		Other ranks.	
	Regular Forces.	Territorial Force.	Regular Forces.	Territorial Force.
August, 1914 ..	1,279	1,889	3,811	12,520
,, 1915 ..	6,230	2,300	49,525	?
,, 1916 ..	9,000	3,300	71,276	40,500
,, 1917 ..	10,370	3,130	93,359	33,000
,, 1918 ..	10,178	2,885	100,176	30,923
Nov., 1918 ..	10,190	2,845	98,986	32,375

The figures in the first column for officers include 150 dental surgeons in August, 1915, 300 in 1916, 501 in 1917, 714 in August, 1918, and 831 in November, 1918.*

The large number of recruits who enlisted in the R.A.M.C. at the beginning of the war, and the mobilization and training of medical units for the divisions of the new armies called for great expansion of depôt accommodation and the establishment of several new training centres. Previous to the war there had been only one depôt where young officers and men of the R.A.M.C. were received and trained. It was at Aldershot, had accommodation for 800 only, and consisted of three depôt companies and a training establishment. One additional company was formed in August, six more in September 1914, and, in the latter month, a provisional company for personnel of the R.A.M.C. returning to England from stations abroad

* The number of dental surgeons increased after the Armistice, 849 being shown on the effective strength in January, 1919, 842 in February, 1919, and 832 in March, 1919. The numbers then gradually declined to 378 in October of that year.

and from the expeditionary force was also formed. The depôt at Aldershot was at first expanded by accommodating 3,000 men in a camp at Redan Hill and some 2,000 more in another camp in Stanhope Lines. They were put into billets in December, 1914, but were later moved into various married quarters and huts in Tweseldown Camp, near Aldershot. In September and October, 1914, the new depôt companies became training centres and were transferred to Tweseldown Camp* and to Llandrindod Wells. Additional training centres for the R.A.M.C. of the new armies were formed at Limerick, Sheffield, Eastbourne, and Tidworth Park on Salisbury Plain. Later on, in 1915, Prestatyn became a training centre for the R.A.M.C. of the Welsh Division, and Ripon was also opened as a R.A.M.C. training centre. The Tidworth Park training centre was transferred to Torquay during the winter of 1914-15, and returned to Salisbury Plain in April, 1915, when it was established at Codford. Other considerable changes were also made, the Limerick centre moving to Dundalk and again to Birr, while the Llandrindod Wells centre moved to Sling, and both were eventually embodied in the Codford centre.

Until 1917 medical units continued to be trained at all these centres. New units were mobilized there and drafts and reinforcements sent from them overseas. The amount of work done in them may be estimated from the fact that they trained and sent overseas the personnel of 94 field ambulances, 5 casualty clearing stations, 6 stationary and 10 general hospitals, 7 motor ambulance convoys, 4 hospital ships, and 20,198 in reinforcement drafts, in addition to men transferred to the Aldershot depôt for the drafts which were being formed there.

The instructional staff for the new training centres was obtained by withdrawing officers and non-commissioned officers of the regular R.A.M.C. from the R.A.M.C. Territorial Force schools of instruction which were permanent institutions in time of peace. Each of the new centres held from 1,500 to 4,000 recruits, and 2 or 3 regular R.A.M.C. officers and 6 to 8 non-commissioned officers were allotted to each.† The training consisted of the usual training in military duties, drill, and stretcher-bearer work. Each training centre was sufficiently large to require a camp hospital of its own, and the men were attached to it in batches for training in hospital duties, although it was recognized that this was inadequate and

* Also known as Crookham Training Centre.

† The accommodation was as follows : Tweseldown 3,000 in huts; Eastbourne 1,000 in tents and huts; Tidworth 3,000 in tents; Sheffield 1,400 in barracks; Llandrindod Wells, 4,000 in billets.

could only be regarded as a preliminary introduction to their training in nursing duties.

The general training carried out in this way at the beginning of the war was necessarily of short duration, as recruits had to be allotted rapidly to the field medical units of the first four new armies, but in order to remedy this state of affairs, instructions were issued in February, 1915, for as many young R.A.M.C. recruits as possible being sent in drafts to the various commands for a course of instruction in hospital work. They were to replace there the men with greater experience, who were then to be withdrawn from time to time to complete the mobilization of new medical units. In a later instruction of the same month the personnel of the R.A.M.C. under training for field ambulances of new army divisions were to remain at their training centres until mobilization was ordered and were not to come under the orders of the division until then. Later on in 1915 it was found impossible to assemble these field ambulances as complete units until very shortly before their embarkation, and in September of that year the whole of the horse transport, including vehicles, harness, and transport equipment, mobilized separately under the officer commanding the divisional train and was trained as a complete unit from a transport point of view under him. It was not handed over to the officer commanding the field ambulance concerned until then.

The territorial force medical units were trained separately at their territorial force depôts. Second line field ambulances were raised as complete units to replace those which had gone overseas with their divisions. They were to be prepared at all times to furnish the best men possible to replace wastage in their first line units, and in turn to have their places filled by men from third line field ambulances, also in process of being formed.* In March, 1915, the functions of the second and third line medical units of the territorial force divisions were more clearly stated. The normal organization was then defined as being in two lines with a third line depôt behind them. All recruits were to be sent in the first instance to the third line; and no man was to be transferred from it until he had completed his recruit's course of training. The third line depôt thus became the depôt in which the Territorial Force R.A.M.C. were trained and from which drafts were provided both for the first and second line medical units. The depôt was normally to be the peace headquarters of the unit. The second line units were to be ready to take the place of the first line units when required,

* The first line units had been making a convenience of the second line units by sending to the latter men unfit for service. This practice was stopped when the above instructions were issued in February, 1915.

and were only to be called upon to provide drafts for the first line when absolutely necessary; and this duty of providing drafts was to cease altogether when the third line depôts were in a position to carry out their allotted functions. The necessary instructional staff for the depôts was to be furnished by the second line units.

The whole system of training the R.A.M.C. was changed towards the end of 1916 and beginning of 1917, when the Aldershot depôt and the various training centres were transferred to Blackpool and concentrated there under an administrative headquarters. At first each of the old centres retained its individuality at Blackpool, with its own instructional staff and organization; each also maintained a depôt for mobilizing new units and providing reinforcement drafts. The men were placed in billets and trained on the sea-shore or promenade of Blackpool. But this organization was broken up in July, 1917. One large training centre with a separate depôt was then formed under the command of a surgeon-general.*

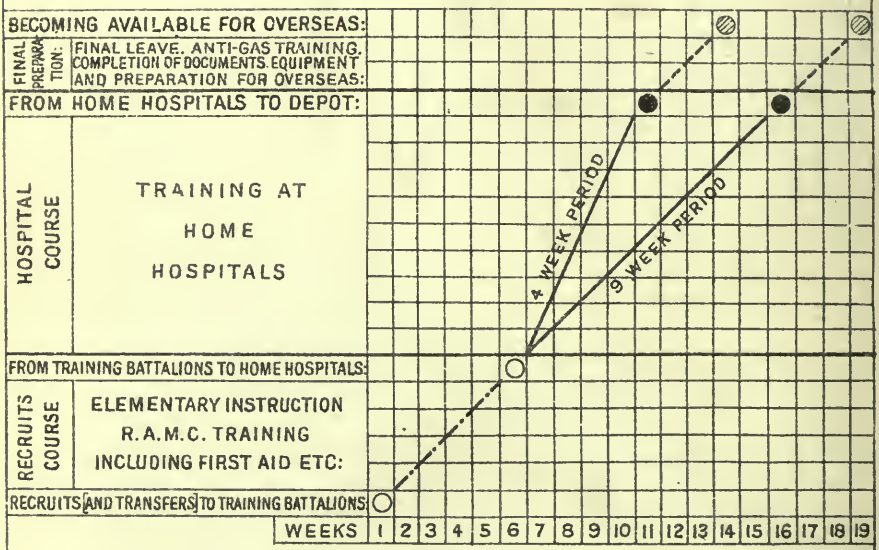
The original organization had produced good results, but it was considered that greater economy in personnel could be effected; that the multiplication of classes for officers and N.C.O.'s was responsible for a considerable wastage of instruction; that there was a lack of uniformity in the training carried out by the various centres, and that the mixing of recruits under training with the mobilization of new medical units and the formation of reinforcing drafts was a serious hindrance to efficient and speedy recruit training. Also there was no fixed establishment of officers and N.C.O.'s.

The training centres, as distinct from the depôt, were accordingly organized on a divisional basis of two brigades of four battalions each, and included an officers' school of instruction. Each battalion consisted of 1,000 recruits. The depôt was organized in five depôt companies, a reserve battalion of three provisional companies, with 600 men in each company, and two territorial force companies; but it also included a non-commissioned officers' training company, a school of instruction for cooks, clerks, X-ray, laboratory and mental attendants, a school of sanitation, an anti-gas school of three sections, and a R.A.M.C. command depôt.† In March, 1918, it

* Surgeon-General A. A. Sutton. He was in command of the depôt at Aldershot at the beginning of the war. He went to Salonika in November, 1915, as D.D.M.S. Lines of Communication, and was recalled from that post to take up this duty at Blackpool with the rank of surgeon-general.

† The command depôt for R.A.M.C. was transferred in July 1917 to Ballykinlar and relieved the depôt of a large number of men who were not yet fit for drafts. The duties of a command depôt at Blackpool had previously been carried out by the provisional companies.

CHART OF MOVEMENT OF R.A.M.C. RECRUITS PREVIOUS TO BEING DRAFTED AS REINFORCEMENTS FOR THEATRES OF WAR.


BECOMING AVAILABLE FOR OVERSEAS:
FINAL PREPARATION:
FINAL LEAVE. ANTI-GAS TRAINING. COMPLETION OF DOCUMENTS. EQUIPMENT AND PREPARATION FOR OVERSEAS:
FROM HOME HOSPITALS TO DEPOT:
HOSPITAL COURSE
TRAINING AT HOME HOSPITALS
4 WEEK PERIOD
9 WEEK PERIOD
FROM TRAINING BATTALIONS TO HOME HOSPITALS:
RECRUITS COURSE
ELEMENTARY INSTRUCTION R.A.M.C. TRAINING INCLUDING FIRST AID ETC:
RECRUITS AND TRANSFERS TO TRAINING BATTALIONS:
WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

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was renamed the R.A.M.C. Reserve Depôt with an authorized establishment consisting of a headquarters, five regular companies, one reserve battalion of three provisional companies, two T.F. companies, 1st and 2nd London sanitary companies, and an anti-gas school of three sections. Specially selected officers of the R.A.M.C. and an adequate instructional staff formed part of the battalion establishment for the supervision of the technical training of the recruits and their instruction in R.A.M.C. duties. The training centre as a whole was under the command of a senior officer of the R.A.M.C., with headquarters staff, who controlled the two brigades. The functions of the training battalions were to receive all recruits and transfers from other arms in rotation of battalions, and have all medical inspection, inoculation, vaccination, and dental, aural and ophthalmic treatment carried out when necessary. The recruits were classified according to their physical fitness for different duties and distinguished by differently coloured badges. Their training lasted four weeks as a minimum, and they were then drafted to home hospitals for instruction in ward duties. They returned then to the R.A.M.C. depôt, as required, to form new units or reinforcements.

In August 1917, owing to the shortage of medical officers, infantry officers unfit for service overseas, gradually replaced R.A.M.C. officers in command of the depôt companies, with the exception of the provisional companies, for company duties, and for instructing in anti-gas measures. This exchange of officers proved successful. Combatant officers carried out their duties, with enthusiasm and loyalty to the R.A.M.C. to which they were attached.

No recruits were received into the depôt companies, which thus consisted entirely of fully trained N.C.O.'s and men, from amongst whom all drafts were found and new medical units mobilized. The reserve battalion received overseas men who had returned to England sick, wounded, or from other causes and who had been sent to the depôt as fit for duty. All men posted to the R.A.M.C. as specialists remained only a week or ten days in the training battalions for vaccination, classification, clothing, and a short modified course of drill. They were then transferred to the depôt for instruction in the specialist schools there, pending their being drafted for specialist work overseas or in home hospitals. Every officer and man went through a course of anti-gas instruction at the depôt before proceeding overseas, and this formed part of his final preparation before embarkation.

The recruiting and training of the Territorial Force R.A.M.C.

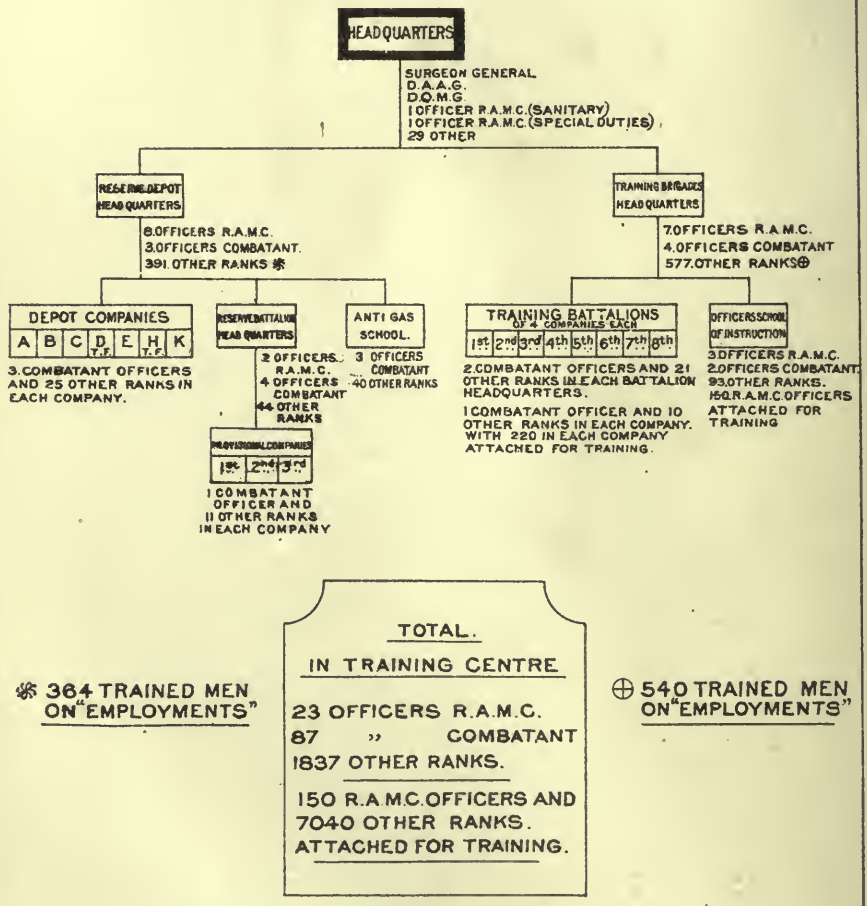
were also brought into line with the training centre and depôt at Blackpool in 1917. In November of the preceding year the third-line mounted brigade field ambulances were disbanded and their ranks posted to the regular R.A.M.C. training centres; and in February, 1917, nine second-line and two third-line territorial force field ambulances were also disbanded in consequence of the formation of home service field ambulances. This was followed in March, 1917, by the abolition of all third-line R.A.M.C. units and depôts of the territorial force, and transferring them as territorial force training companies of the R.A.M.C. training centres at Blackpool; with the exception of the London sanitary companies, which continued to receive recruits at the Duke of York's school in London until July, 1918, when they were also transferred to Blackpool. But when the reorganization of the Blackpool training centres was carried out in July, 1917, by Surgeon-General Sutton, and as no recruits were being posted to T.F. units, the T.F. training companies then became depôt companies of the R.A.M.C. depôt and provided the reinforcement drafts for the T.F. medical units overseas. The various depôts and training centres for R.A.M.C. T.F. were thus merged in the one training centre and depôt of the R.A.M.C. at Blackpool.

This new organization proved most effective and continued till the end of the war, when the training centre was demobilized and the depôt returned to Aldershot in March, 1919, moving in the following September to new permanent quarters in hutments at Tweseldown Camp. The reserve battalion, however, remained at Blackpool as the demobilization centre and clearing unit for R.A.M.C. returning from the expeditionary forces. It consisted then of about 6,000 men, some of whom were not eligible for demobilization and were sent to the depôt or direct to home hospitals.* By October, 1919, the numbers in it had decreased to that of an ordinary company, and it then rejoined the depôt at Tweseldown as a provisional company there. The London sanitary companies also remained at Blackpool in order to take advantage of the school of hygiene established there.

The work of the R.A.M.C. depôt from October, 1914, to June, 1918, included the despatch of 29,604 reinforcements to all theatres of war and the mobilization of personnel for 47 general hospitals, 26 stationary hospitals, 42 casualty clearing stations, 32 ambulance trains, 38 motor ambulance convoys, 51 hospital

* The number demobilized up to the end of 1919 through the reserve battalion was 10,948. 35,000 men had passed through the provisional company or reserve battalion since its formation.

ORGANIZATION OF THE R.A.M.C. RESERVE TRAINING CENTRE BLACKPOOL.


HEADQUARTERS
SURGEON GENERAL
D.A.A.G.
D.Q.M.G.
1 OFFICER R.A.M.C.(SANITARY)
1 OFFICER R.A.M.C.(SPECIAL DUTIES)
29 OTHER
RESERVE DEPOT HEAD QUARTERS
8 OFFICERS R.A.M.C.
3 OFFICERS COMBATANT.
391 OTHER RANKS ✠
TRAINING BRIGADES HEAD QUARTERS
7 OFFICERS R.A.M.C.
4 OFFICERS COMBATANT
577 OTHER RANKS ⊕
DEPOT COMPANIES
A B C D T.F. E H T.F. K
3 COMBATANT OFFICERS AND 25 OTHER RANKS IN EACH COMPANY.
RESERVE BATTALION HEAD QUARTERS
2 OFFICERS R.A.M.C.
4 OFFICERS COMBATANT
44 OTHER RANKS
PROVISIONAL COMPANIES
1st 2nd 3rd
1 COMBATANT OFFICER AND 11 OTHER RANKS IN EACH COMPANY
ANTI GAS SCHOOL.
3 OFFICERS COMBATANT
40 OTHER RANKS
TRAINING BATTALIONS OF 4 COMPANIES EACH
1st 2nd 3rd 4th 5th 6th 7th 8th
2 COMBATANT OFFICERS AND 21 OTHER RANKS IN EACH BATTALION HEADQUARTERS.
1 COMBATANT OFFICER AND 10 OTHER RANKS IN EACH COMPANY. WITH 220 IN EACH COMPANY ATTACHED FOR TRAINING.
OFFICERS SCHOOL OF INSTRUCTION
3 OFFICERS R.A.M.C.
2 OFFICERS COMBATANT.
93 OTHER RANKS.
150 R.A.M.C. OFFICERS ATTACHED FOR TRAINING

✠ 364 TRAINED MEN ON "EMPLOYMENTS"

TOTAL.

IN TRAINING CENTRE

23 OFFICERS R.A.M.C.
87 " COMBATANT
1837 OTHER RANKS.

150 R.A.M.C. OFFICERS AND 7040 OTHER RANKS. ATTACHED FOR TRAINING.

⊕ 540 TRAINED MEN ON "EMPLOYMENTS"

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Malby & Sons, Lith.

ships, several field ambulances and cavalry field ambulances, 12 advanced and 12 base depôts of medical stores; exclusive of reinforcements and units, mentioned above, which were mobilized from the training centres previous to the concentration at Blackpool. A number of officers of the Medical Reserve Corps of the United States Army also went through a course at the Blackpool R.A.M.C. depôt.

CHAPTER IX

THE SUPPLY OF MEDICAL AND SURGICAL EQUIPMENT AND STORES

MEDICAL and surgical supplies are to the Army Medical Service what ammunition is to the fighting forces. The task of providing medical and surgical equipment and stores was consequently a task of the highest importance, and second to none other during the war, so far as the care of the sick and wounded was concerned. Without a constant and sufficient supply at all times and in all places the personnel of the medical services would have been powerless. The branch of the directorate of medical services at the War Office, of which Colonel G. B. Stanistreet had charge until the beginning of 1918 and Colonel J. R. McMunn after him, was responsible for the organization, provision and maintenance of this service. From its very nature it was a highly centralized service, as otherwise wastage, overlapping and loss of control, with their resulting confusion and lack of economy, could not have been avoided. Careful and valuable records were maintained by the branch, and it has been possible from these to give an account of the immense work done by it and the great responsibilities of its task under conditions of exceptional difficulty.

On the 4th August, 1914, field medical equipment and medical stores were ready for issue to the regimental and medical units of the original expeditionary force; the regimental and field medical units of the Territorial Force were in possession of their peace scale of field medical equipment, and the additional equipment required to bring them up to war scale was ready for issue; the military hospitals had their usual stock of medical and surgical stores to meet peace requirements; there was a small reserve of field medical equipment and other medical stores, such as medicine chests and general fracture boxes, in the Army Medical Stores at Woolwich; and the contractors for medical and surgical stores were in possession of their customary stocks for meeting peace requirements. There were also two subsidiary medical stores, one at Southampton for medical and surgical supplies to transports, and the other at Dublin for the Irish Command.

On the outbreak of war, contractors were at once warned to make arrangements to meet very large demands for medical and surgical stores,* all the available field medical equipment was secured from the trade and withdrawn from hospitals, and special arrangements were made for the supply of vaccines and sera for the prevention and treatment of disease, including very large quantities of anti-typhoid vaccine, tetanus anti-toxin, anti-sepsis vaccine, and cholera vaccine. Large reserves of surgical dressings were obtained and despatched to France very shortly after the departure of the expeditionary force.

In order to avoid shortage of medical stores, steps were taken by a Royal Proclamation dated the 3rd August, 1914, to prohibit the exportation of surgical dressings. A list of the estimated requirements of drugs for the army for a period of twelve months was drawn up, and after consultation with the directors of the leading wholesale drug firms a further Royal Proclamation, dated the 10th August, 1914, prohibited the exportation of those drugs of which there was likely to be a shortage. The matter continued to be considered from time to time in consultation with the Contracts Branch of the War Office and the National Health Insurance Commissioners with a view to safeguarding the needs not only of the army but also of the civil population. Various Royal Proclamations and Orders of Council were subsequently issued, as the war progressed, and further additions were made to the list of drugs and surgical dressings, surgical instruments, X-ray apparatus and other articles, raw and manufactured, the exportation of which was prohibited.

The staff of the Medical Supplies Branch of the War Office on the outbreak of war and the additions made to it during the progress of the war have already been noted. It had been gradually increased from one R.A.M.C. officer, an Inspector and Assistant Inspector of Medical Supplies and three clerks, to a total during 1918 of 6 officers, 22 technical assistants, and 82 clerks, including 49 ladies.† Four specialist officers also gave part-time assistance in inspecting surgical instruments and appliances and X-ray apparatus. The Medical Supplies Branch was completely reorganized and divided into sections for dealing with the various supplies, such as field medical equipment, drugs, including tablets, surgical

* On the 13th of August the Director-General gave instructions to his medical and surgical supplies branch to maintain dressings for 100,000 wounds in the Army Medical Stores. The market was then rapidly becoming exhausted owing to the purchases made on behalf of private hospitals.

† At the end of 1917 the numbers were : 4 officers, 21 technical assistants, and 51 clerks, including 37 ladies. In 1919 the numbers were: 5 officers, 18 technical assistants, and 74 clerks, including 40 ladies.

dressings of all kinds, surgical instruments and sterilizers, operating room furniture, cylinders of oxygen and nitrous oxide, medical and surgical appliances, including rubber goods, splints, electro-medical and mechano-therapeutic outfits, vaccines and sera, pathological and bacteriological outfits, X-ray outfits, dental outfits, spectacles, home indents, overseas indents, shipping of stores, contracts, returns, accounts, registers, and other matters.*

The storage accommodation (21,495 square feet) of the Army Medical Stores at Woolwich, which were originally established chiefly for the supply, packing, and storage of mobilization medical equipment for the expeditionary force, was trebled during the first year of the war by the erection of 16 sheds, which afforded an additional 34,925 square feet of storage space, and by the hire of the Plumstead skating rink (9,720 square feet), close to Woolwich Arsenal railway station, and another small store. The staff, which on the outbreak of war consisted of a quartermaster and 22 non-commissioned officers and men, was increased to two quartermasters and 110 subordinates of both sexes, most of whom were civilians.†

In consequence of the great difficulty of obtaining in reasonable time medical and surgical stores in the vastly increased quantities necessitated by the extension of active operations in the field, it was found necessary after the first year of the war to increase the storage accommodation at Woolwich still further. A Reserve Medical Store was consequently established, at first in temporary premises at a disused depôt of the Plumstead tramways, which was taken over on the 11th October, 1915, and afforded 20,814, square feet of storage accommodation. Subsequently, during the first half of 1916, nine large sheds with 38,250 square feet of floor space were erected on Woolwich Common close to the existing Army Medical Store. The tramway depôt was still retained for the storage of surgical dressings, and the two premises afforded 59,000 square feet of storage accommodation. Later on, this was increased by the opening of two branch stores, which brought the total storage accommodation at the time of the Armistice up to 99,000 square feet. The staff of the reserve store and its branches consisted of three quartermasters and 125 subordinates, chiefly civilians, both men and women.‡

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* Mr. J. B. Barnes was the inspector of medical supplies and Mr. W. H. Walden the assistant inspector during this period of ever-increasing work.

† *See* Appendix E, Table I.

‡ The organization and the expansion of the medical stores at Woolwich were carried out by Lt. and Q.M. J. Ritchie and Lt. and Q.M. W. E. Squire, R.A.M.C.

The value of the stores held in reserve in the Army Medical Stores at Woolwich, which was about £100,000 prior to the war, was estimated to be about £1,000,000 by the end of 1917. The stores were organized to maintain a reserve estimated to last from three to six months, according to the rapidity with which the stock of the various articles could be replenished.*

The position of the reserve was reviewed monthly in the case of articles of which a three months' reserve was held and quarterly in the case of articles of which a six months' reserve was maintained. In the case of the former, on the 1st of each month a statement was prepared of the issues made during the preceding month, the quantities issued were multiplied by three, and if the stock thus computed was not available in store, indents were submitted to the War Office for the balance required to make up a three months' reserve. Similarly, in the case of articles of which a six months' reserve was maintained, on the 1st day of each quarter a statement was prepared of the issues made during the preceding three months, the quantities issued were multiplied by two, and indents submitted to the War Office for the balance required to make up a six months' reserve.

By these means the quantities of the various articles held in reserve underwent frequent revision and turn over, and varied at monthly or quarterly intervals according to recent demands, so that undue accumulation of stores for which the demand had fallen off was avoided. With the same object in view, the officer in charge of each store submitted to the War Office on the 7th of each month a list of stores for which there had been little or no demand during the previous month, in order that indents for such articles might be passed to him direct for supply instead of being sent to the contractor.

In addition to the two large stores at Woolwich and the medical stores at Dublin and Southampton, depôts of medical stores were opened at one time or another during the first three years of the war at Bristol, Liverpool, Reading, Northampton, Edinburgh, York, Cosham, Aldershot, and Dover.† The depôts at Bristol and Liverpool were originally organized as base depôts of medical stores for the Central Force, and those at Reading and Northampton as advanced depôts to be supplied by them in the event of operations in the United Kingdom. An additional store was opened at Golborne in September, 1918, for surgical dressings, and stores were established early in

* A list of the principal articles thus held in reserve is given in Table II, Appendix E.

† The staffs and storage accommodation of these depôts are given in Table I, Appendix E.

1919 at Southwick in Surrey and at Ramsgate for the reception of stores and equipment from demobilized units pending disposal. Arrangements were made to obtain medical and surgical supplies for the hospitals and troops in Scotland from Scottish firms, in the same way as the supplies in Ireland were being obtained before the war from Irish firms.

The general system adopted for complying with indents received at the War Office from medical store depôts and hospitals was as follows: The indent was passed to the contractor concerned with a three, seven, or ten days label* attached, according to the urgency of the demand. On receipt from the contractors of lists of articles which they were unable to supply within the specified period, indents for these were sent to the Army Medical Store or Army Medical Reserve Store, as the case might be, for supply. If the indents contained any articles which the Army Medical Stores were unable to supply, the officer in charge at once reported to the War Office, when special arrangements were made to procure them from the trade, or to expedite their supply by the contractors. A departure from this procedure was made in the case of the majority of the stores of which a six months' reserve was maintained, the indents for these stores being passed direct to the Army Medical Stores instead of being passed to the contractors in the first instance.

The number of indents for medical stores and equipment received at the War Office between the 4th August, 1914, and 3rd August, 1919, was over 107,300;† of this number over 54,500, or an average of nearly 50 a day, were received during the first three years, and 52,800, or an average of 72 daily, during the remaining two years, A very large number of these indents, especially those received from medical store depôts overseas, included many hundreds of items, necessitating the placing of large orders with many different contractors, so that an immense amount of work was involved in dealing with them.

Owing to the vast quantity of medical and surgical stores and equipment which had to be provided, the medical authorities were obliged to purchase from firms other than the regular contractors. More than 800 firms were consequently employed

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* The 3-day label was coloured red to show urgency; the 7-day label green, and the 10-day label blue. The instructions on the label were as follows: "The full quantities of every item on this indent must be packed and ready for despatch within — days of its receipt. If you are not in a position to comply with this order, you must, within 24 hours of the receipt of the indent, send to the Inspector of Medical Supplies, War Office, a complete list of what you are unable to supply within the days specified."

† *See* Appendix E, Table III.

in meeting requirements and over 5,200 special contracts were made. Some idea of the extent of the purchases may be formed from the fact that whereas the average expenditure on medical stores was only £28,500 per annum for the three years preceding the war, £475,962 were spent during the financial year 1914-15, £2,656,335 in 1915-16, £2,700,863 in 1916-17, £3,961,932 in 1917-18, and £3,009,928 during 1918-19. After the Armistice there was a steady decline in expenditure on medical and surgical supplies, the monthly expenditure falling from £274,305 during the month previous to the Armistice, to £53,151, which included sums paid by way of compensation for cancellation of contracts in July, 1919.

Very considerable difficulty was experienced in obtaining supplies during the early months of the war until the various medical and surgical supply trades were sufficiently expanded and organized to cope with the rapidly growing needs. To meet the difficulty special reserves of medical stores were accumulated as rapidly as possible, a careful system of card-indexing the arrears of contractors was introduced by Captain A. White-Robertson, R.A.M.C., who was detailed for the purpose of systematically visiting the firms, with the result that the balance of supply and demand was gradually restored, and although the amount of medical and surgical stores assumed immense proportions the arrears in their supply no longer caused anxiety.

Medical equipment and stores for the whole of the military hospitals in the United Kingdom and with the armies overseas were provided and maintained. Enormous quantities of surgical dressings were issued to the armies in the field and to the hospitals at home.* For example, 109 million bandages, sufficient to go nearly fourteen and a half times round the world, over 87,721 miles of gauze, and over 7,251 tons of cotton-wool and lint were supplied during the five years, August, 1914, to August, 1919. A considerable saving was effected by large issues of medicated and plain sphagnum moss dressings, otherwise the quantity of cotton-wool and other dressings material would have been much larger. In addition, a reserve of surgical dressings calculated to last for six months was maintained in the Army Medical Stores at Woolwich. This reserve was subsequently increased to twelve months' supply owing to the increasing difficulties in obtaining adequate supplies and the increasing risk of losses due to submarine warfare.

The arrangements for the despatch of medical stores overseas at times gave rise to much trouble and anxiety owing to the

* *See* Appendix E, Table IV.

delay involved in shipping and transhipping stores to their destination. This was especially the case after the submarine menace became serious in 1917. Elaborate instructions were issued from time to time to contractors and the Army Medical Stores with a view to expediting despatch and preventing the miscarriage of stores. Close on 553,000 cases and bales of medical stores, amounting to more than 84,000 shipping tons were despatched overseas during the war.* The total losses of medical stores at sea resulting from enemy action amounted to 5,000 cases and bales, valued at about £70,000.

Sixteen base depôts of medical stores were established with the various armies in the field; five in France (Nos. 1, 2, 3, 6, and 13), three in Salonika (Nos. 7, 9, and 12), three in Egypt (Nos. 4, 5, and 8), one in Mesopotamia (No. 10), one at Bombay (No. 11), one in Italy (No. 14), and two in North Russia (Nos. 15 and 16). From all of them very frequent indents for immense quantities of medical and surgical stores of all kinds were received. The earlier of these base depôts originally took out an average of 40 tons of medical stores in 1,000 cases, but the later depôts took 90½ tons in 1,850 cases,† and all of them expanded to great dimensions after they had opened overseas. In addition to these, medical store depôts were established at Cairo, Malta, Nairobi, and Dar-es-Salaam, as well as thirty advanced depôts in the various areas of operations.

The medical equipment for all the regimental and medical units of the vast armies in the various fields of operations had to be provided on their mobilization and afterwards replenished. This included the equipping of 206 field ambulances, 76 casualty clearing stations, and 134 general and stationary hospitals. In addition to these, 66 hospital ships and 772 transports were also equipped; 32 of the former being provided with X-ray installations and 24 with apparatus for the production of hypochlorite solution by the electrolysis of salt water. When special types of shallow-draught hospital steamers (130 to 200 beds) and auxiliary hospital barges (100 beds) were designed for river work in Mesopotamia, 29 of the former (19 fitted with operation theatres) and four of the latter were provided with a special scale of medical and surgical equipment.

The equipment of units involved the supply of nearly 129,000 complete medical and surgical panniers, medical companions, surgical and shell dressing haversacks, fracture boxes, reserve dressing boxes and water-testing cases, in addition to about

* *See* Appendix E, Table V.

† No. 14 Base Depôt, which went to Italy, and No. 15, which went to North Russia, took about 60 tons of additional stores with them.

1,750 tons of other medical stores.* Owing to the necessity for somewhat elaborate fittings in order to economize space, the field medical equipment took a considerable time to procure and a large reserve of this class of equipment was consequently maintained in the Army Medical Store.

Many additions were made to the scales of the field medical equipment of the various medical units as a result of the experience gained during the war. The contents of a base depôt of medical stores and the medical and surgical supplies of a general hospital were also completely revised and more than doubled in quantity. For example, the cases and bales in a base depôt were increased from 722 to 1,850 and the weight from 25 tons to 90½ tons, as noted above, and those in a general hospital from 180 cases to 367 with an increase of weight from 6 tons to 14 tons.

Owing to the scarcity of aluminium, the contents of the field fracture box had to be revised in order to replace aluminium by malleable steel. This involved the preparation of fresh instructions, new patterns and drawings. The malleable steel and the new method of joining the pieces required to make the various splints proved a great improvement on aluminium and on the former method of jointing.

A new pattern field operating table was designed, the former pattern having proved too weak and flimsy.

Special first-aid outfits were designed for use with aeroplanes and tanks.

Iodine ampoules containing 30 minims of tincture of iodine were introduced in the early days of the war for use in conjunction with the first field dressings which contained gauze impregnated with 2 per cent. to 3 per cent. by weight of double cyanide of mercury and zinc. In July, 1917, however, it was represented from France that the consulting surgeons there were of opinion that the addition of iodine to the first field dressings served no useful purpose, and caused blistering of the skin in many cases when used in conjunction with cyanide gauze. Consequently, after careful consideration of the whole question in all its aspects by the consulting surgeons at home and abroad, it was decided to abolish the use of the iodine ampoule in conjunction with the first field dressing.

The adoption of sterile, unmedicated first field dressings had been previously considered and rejected on the grounds that no such dressing could be kept sterile more than a few weeks, that the jaconet wrapper would not stand the heat of an autoclave, and that an "antiseptic" dressing was preferable to

* See Appendix E, Tables VI, VII and VIII.

a "sterilized aseptic" dressing, when the fact was considered that the dressing was always liable to be contaminated during application in the field, even although the existing dressings were carefully prepared and free from pathogenic organisms.

The white bandage of the first field dressing had to be replaced by a *khaki* bandage as the former was considered to be too conspicuous in the field. Much trouble was experienced in devising a suitable *khaki* dye which would produce the required colour without causing deterioration of the bandage, and at the same time prove harmless if brought into contact with the wound. The first process used, permanganate of potash and glucose, had to be abandoned as it was found to weaken the bandage, and a dye composed of cutch, fustic extract and copper sulphate was adopted and proved satisfactory,

An enlarged form of first field dressing was introduced in March, 1915, for application to the large shell wounds for which the regulation first field dressings were too small. These were supplied in haversacks containing twelve shell dressings each, and a definite scale was laid down for regimental and field medical units, and as a reserve for replenishing haversacks.

In March, 1915, a committee, composed of the professor of military surgery and two eminent London operating surgeons, was assembled at the War Office for the purpose of revising and standardizing the scale of surgical instruments authorized for military hospitals and bringing it thoroughly up to date. All the sealed patterns were assembled and carefully inspected, old patterns were discarded, new patterns selected, a large number of new instruments added, and scales drawn up for different classes of hospitals. Some hundreds of thousands of surgical instruments were purchased from the principal manufacturers and delivered at the Army Medical Store, where they were submitted to careful inspection by experts before being taken into stock. A large number was rejected and had to be replaced by the contractors.

Some difficulty was experienced in the early months of the war in obtaining a sufficient number of reliable clinical thermometers and arrangements were subsequently made to employ only the best makers of those instruments. A number of thermometers taken from each consignment was tested at the National Physical Laboratory, and if 5 per cent. failed to pass the test the whole consignment was rejected. Arrangements were made later to test all the thermometers manufactured for the army so as to ensure a supply of uniformly reliable instruments. These measures resulted in the supply

of excellent thermometers, the total issued during the war amounting to 1,086,000.

Various designs of mobile operating theatres, with and without X-rays, were submitted to the War Office, but no mobile operating theatre similar to the "*Automobile Chirurgicale*" used in the French Army was evolved. An improvised arrangement, described as the "Wallace-Cowell Theatre Trailer," attached to a motor lorry was, however, prepared in France as an outcome of instructions issued from G.H.Q. for all casualty clearing stations to have ready a schedule of equipment for the rapid advance of a light section such as would be capable of forming an advanced operating centre in a war of movement.*

Mobile laboratories of various kinds were designed and equipped for bacteriological, hygienic, X-ray and ophthalmic work at the front, and twenty-five bacteriological, ten hygiene, and fourteen X-ray mobile laboratories were sent overseas.† In addition, a mobile giant eye-magnet, specially designed by the medical supplies branch at the War Office, was sent to France.

Five motor dental cars were presented to the British Army and sent to France.

X-ray outfits suitable for the requirements of field service and hospital ships, as well as for military hospitals at home and abroad were designed. Eight different types including motor and trolley outfits were brought out during the war, and 528 outfits were supplied, a reserve calculated to last six months being maintained in store.

The maintenance of these outfits involved the supply of a very large number of X-ray tubes and X-ray plates, over 4,100 of the former having been issued during the two years prior to the signing of the armistice. Thousands of indents were received and many of these included spares and replacements, amounting in the aggregate to a large number of complete outfits. The expenditure on photographic accessories alone amounted to a very large sum. Thus, for the year ending 3rd August, 1917, the amount spent was £52,000.

The work of the X-ray section at the War Office became highly technical, involving, as it did, not only the inspection and testing of every outfit, but the design of new outfits, and of many new contrivances to render the equipment suited to war conditions. A well-illustrated book of instructions was issued to enable operators without previous field experience to

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* *See Journal of the R.A.M.C.*, vol. xxviii, p. 708.
† *See* Appendix E, Table IX.

become familiar with the various types of field service outfit.* The designs included an outfit specially suitable for X-ray work at casualty clearing stations, and a special X-ray table combining the functions of the tube stand, table and vertical screening stand of the earlier oufits. A portable form of localizer designed at the beginning of the war was very widely used and proved to be capable of the most accurate localization. A light wooden portable folding tube stand was made for the portable trolley. An X-ray film was produced in 1917 which possessed the advantage of greater safety in transit, but the difficulties of handling and drying militated against its general adoption.

On testing the outfits obtained from contractors during the earlier days of the war, it was found that they did not sufficiently protect the operator when working under war conditions. Many of the outfits had, therefore, to be re-designed and fitted with reinforced protection. Apparatus had also to be designed for ascertaining the extent of the protection afforded by those outfits which had already been issued.

Difficulty was experienced in obtaining satisfactory X-ray and valve tubes, America being practically the only source of these when the German supply was cut off. Encouragement was consequently given to the British manufacturer by the purchase of British-made tubes, where such a course was consistent with efficiency. As a result, 40 per cent. of the tubes required by the army were being produced in Great Britain by 1917. Much assistance was given to manufacturers by the War Office and by the research department of the Advisory Council, which undertook research in connection with X-ray tubes, with the result that the quality of English X-ray tubes approached the high quality of those of American manufacture. In the later years of the war the hot cathode X-ray tube was supplied in much larger quantities in view of its distinct advantage over the gas tube.

At the end of 1915 a committee of experienced radiologists and physicists was formed, under the chairmanship of Lieut.-Col. Archibald D. Reid, to assist the X-ray section of the Army Medical Supply Branch. This committee dealt with a variety of important technical details. They inspected and advised on technical matters connected with the X-ray departments of hospitals ; assisted in the design of the various types of X-ray outfits ; drew up specifications for X-ray apparatus and materials ; examined and tested new X-ray appliances of all kinds, both from the medical and physical aspects ; designed

* " Field Service X-ray Outfit Instructions," a book containing 69 closely printed pages, with numerous illustrations and diagrams.

the apparatus for testing *in situ* the efficiency of the protection afforded by X-ray appliances ; designed laboratory methods of testing, and carried out the routine testing of X-ray appliances such as coils, interrupters, fluorescent and intensifying screens, and protective material ; prepared instructions to be observed by operators for protection from the harmful effects of X-rays ; reported on and tested the most suitable designs of a generating set for X-ray work ; designed the vehicle for mobile X-ray outfits and a mobile eye-magnet ; designed an X-ray register and ward report forms ; advised regarding the placing of contracts for X-ray equipment ; supervised the assembling and storing of X-ray apparatus and equipment ; classified for repair apparatus returned in an unserviceable condition ; carried out experimental and research work, and trained orderlies in practical radiology and in the care, use and repair of X-ray apparatus. The committee also undertook during the later years of the war to grade officers of the R.A.M.C. in their knowledge of radiography ; and for this purpose a number of distinguished radiologists was added to it.

Through the kindness of the Governors of the Imperial College of Science and Technology, the War Office X-ray committee had the facilities of the physics department and workshops of that institution placed at their disposal, and accommodation of over 10,000 square feet was provided for the storing and testing of X-ray equipment and for instructional work in radiography and in the care and use of X-ray apparatus. A suitable staff under the direction of the committee was appointed by the War Office for the work involved. The staff included an expert officer in charge, a lecturer in radiography, three physicists, and nine others as electricians and for carpentry, storekeeping and other duties. By the establishment of a store for X-ray apparatus, in close association with the physics laboratories and workshops, very thorough testing of outfits was facilitated and much efficiency was obtained by the training of orderlies at an institution where they could obtain experience with every type of apparatus in army use. In January, 1919, the War Office X-ray laboratory was transferred from the Imperial College of Science and Technology to Hortensia Road, Fulham, and in July of the same year was divided into two departments ; one for testing only, and the other for storing and issuing equipment.

Owing largely to the depletion of the staffs of manufacturers through the men being urgently required for military service and to the increasing requirements of other Government departments, it was evident early in 1918 that, should the war continue throughout the year 1919, it would be impossible

to obtain the army's requirements in X-ray and electro-medical equipment under the then existing conditions of trade organization. Consequently, after conferring with other Government departments, the contracts department of the War Office decided to control the industry with a view to increasing output by the standardization of production. A committee of representatives of Government departments was then formed to carry out the work of standardizing requirements, and the War Office representatives undertook the preparation of complete specifications of all the items of equipment which could be purchased in common by the various departments through the War Office contracts department.* This committee continued active until the date of the Armistice, and by that time had practically completed the work of standardization of the apparatus and the preparation of specifications. On the signing of the Armistice, the suggested control of the X-ray and electro-medical trade was abandoned.

With regard to the supply of spectacles to serving soldiers, to which reference has been made in connection with recruiting, an army spectacle depôt was established early in 1916 under the management of Mr. J. R. Sutcliffe at Clifford's Inn Hall, kindly placed at the disposal of the Army Medical Department by the British Optical Association, and 93 ophthalmic centres were established in the various Home commands by the end of the war, each centre being in charge of an ophthalmic surgeon, assisted by an enlisted qualified optician. Thirty-one similar centres were also established in France, Egypt, Mesopotamia, Salonika, Malta, and Gibraltar. At these centres all soldiers with defective vision, whose efficiency was materially affected, were carefully examined and supplied at the public expense with suitable round-eye army pattern spectacles of excellent quality, made up in accordance with the ophthalmic surgeon's prescription, the necessary frame measurements being recorded thereon by the optician. The ophthalmic centres both at home and abroad were equipped with ample stocks of spectacle frames and lenses and with all the necessary modern ophthalmic and optical appliances.

Originally intended only for the fulfilment of spectacle prescriptions, the army spectacle depôt eventually supplied all the spectacles, artificial eyes, optical tools and ophthalmological apparatus, such as cases of trial lenses, fitting sets, trial frames, lamps and test types, necessary to meet the requirements of the army both at home and overseas, and also carried out the repair of spectacles. The depôt employed a staff of about

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* *See* Appendix E, Tables XI and XII.

eighty, all except six being girls. It was well equipped with grindstones, surfacing machines and other plant. The great expansion of the work of the depôt necessitated the erection of two large huts at Clifford's Inn. A record of every pair of spectacles supplied under the scheme was kept. The spectacle frames supplied by the depôt were made of non-tarnishable white metal of the best quality and workmanship, with curl cable sides, and were mostly of British manufacture. Forty-eight different fittings were kept in stock and were altered when necessary to meet exceptional measurements. The lenses were of the best white crown glass ; most of them were surfaced by various outside lens manufacturers, but the more intricate and deeper curves were surfaced at the army spectacle depôt. Nearly all the lenses used were received in an uncut state, the circular bevel edging being completed by the staff of the depôt. Each pair of spectacles was supplied in a metal case. Over 193,700 pairs of spectacles were issued during the war to home centres alone, and, in addition, 156,271 frames, 472,488 lenses and 125,861 spectacle cases were supplied to ophthalmic centres and base depôts overseas. During the first few months in which the scheme was in operation the average number of soldiers supplied with spectacles at home was 1,000 monthly ; the numbers eventually averaged about 5,000 per month and included supplies to the Dominion contingents and certain of the Allies in England, as well as to soldiers discharged to pension.

In addition to the provision of spectacles, the army spectacle depôt designed and arranged for the manufacture of a special pattern of sun-goggle, 300,000 pairs of which were sent out to the troops in Egypt and Mesopotamia early in 1916. Since that date material improvements in the pattern, including the substitution of glass for celluloid eye-pieces, were effected at the depôt.

Considerable difficulty was experienced in obtaining an adequate supply of artificial glass eyes, which before the war were chiefly obtained from enemy countries. To meet the difficulty stocks held in the United Kingdom were purchased or requisitioned and endeavours were made to increase the manufacture of artificial eyes in England.* In order to make the best use of the available stock of eyes, an artificial eye centre was established in each command, to which all cases requiring artificial eyes were sent. These centres were kept supplied with artificial eyes from the large central stock at the army spectacle depôt. The supply of artificial eyes was taken over by the depôt in December, 1916, but the actual purchasing was

* There were only about six actual makers in this country and they were averse from teaching others their trade.

transferred in April, 1917, to the Optical Munitions Glass Department. The total number of artificial eyes procured from the trade both by ordinary purchase and requisition between December, 1916, and 3rd August, 1919, was 88,412, of which 22,386 were issued to the ophthalmic centres. A portion of this quantity was issued in the form of cases, each containing 150 assorted eyes.

Owing to the extreme difficulty of obtaining special artificial eyes for deformed sockets and to the lack of facilities for taking suitable measurements, the existing stocks of artificial eyes at the depôt were largely increased by purchases of ordinary and abnormal shapes from all possible sources. The superintendent of the army spectacle depôt visited Paris to study French systems of manufacture, and eventually arrangements were made whereby a staff of about twenty girls was employed in classification, matching, alterations, and glass-blowing. Small glass-making furnaces were installed with the object of research and making of the various enamels as used in the German systems.

With regard to dental equipment, five different dental outfits were designed to meet the requirements of dental surgeons and dental mechanics at home and overseas, and 1,867 of these outfits were issued.* The specifications of these outfits were revised from time to time, as increased experience was gained in army dentistry. Special equipment was provided for new dental centres which were established in certain hospitals for the treatment of jaw injuries, and special equipment was also supplied to command dental workshops, each of which employed from 20 to 100 dental mechanics.

All the materials required by the army dental surgeons and mechanics at home and overseas were provided through the medical supplies branch of the War Office. Heavy demands from the India Office, the Royal Air Force, and Dominion Contingents overseas were also met through the same agency. The total number of indents issued exceeded 18,100, involving the supply of about four million artificial teeth, between six and seven hundred tons of plaster of Paris, and 13½ tons of dental rubber.

To meet the extension of dental treatment in the army, arrangements were made in 1918 for the further purchase of 400 home dental outfits for early delivery. This could only be effected by approaching the various civil dental hospitals and schools throughout the country with a view to the hire or purchase of any dental chairs or dental engines which were

* *See* Appendix E, Tables XIII, XIV, XV and XVI.

surplus to their immediate requirements. Nearly 140 chairs and a few engines were readily obtained in this manner.

Electro-medical and mechano-therapeutic equipment consisted chiefly of :—

Switchboards :

(1) Galvanic and Faradic.
(2) Galvanic only.
(3) Sinusoidal.

Tables :

(1) Galvanic and Faradic.
(2) Faradic.

Universal earth-free machines.
Vibrators for massage, electrically driven.
Radiant heat baths, including portable limb and trunk baths, also Dowsing radiant heat apparatus.
Galvanic and Faradic batteries for treatment and muscle and nerve testing.
Arm and foot cells.
Schnee four-cell baths.
Diathermy and high frequency apparatus.
Condenser muscle-testing sets.
Electrodes of various kinds, with connecting cables.
Ultra-violet light apparatus.

These types of apparatus were supplied to 24 command depôts and orthopædic and convalescent hospitals, and to a large number of military hospitals.

For command depôts and camp convalescent hospitals where it was not economical to run the electrical generating plant during the daytime merely for the purpose of supplying current for electrical treatment a storage battery system was designed in conjunction with the engineering branch of the War Office concerned, which enabled the radiant heat baths to be switched on and off without interfering with the constancy of voltage requisite for galvanic treatment.

During 1917 a committee of electro-medical and physical experts rendered valuable assistance in standardizing the equipment and advising on technical matters. Specifications of standardized equipment, involving the design of apparatus specially suited to military requirements, were prepared.

Special appliances were designed which made it possible to give galvanic treatment from the mains in such a way that the possibility of earth-shocks was eliminated. Great economy was thus effected as the necessity for installing an expensive earth-free battery or motor-generator was obviated. The electrodes and connecting cables issued were reduced to the simplest forms consistent with efficiency, the standardized equipment

being fitted with special universal terminals of simple design to accommodate the standardized cable ends. A book of instructions in the use of the standardized electro-medical equipment was prepared by the War Office electro-medical committee. It dealt with both the medical and physical aspects of the subject and included a complete schedule of articles of electro-medical equipment issued by the War Office.

Various mechano-therapeutic apparatus were also supplied, such as massage plinths, peg posts, pulley weight machines with rowing attachments, pulley weight machines for wrist work, nautical wheels, frictional wrist machines, stationary cycle exercisers, finger grip exercisers, Indian clubs, medical stools, and wall bars. A special combination exercising machine combining most of the features of the above apparatus, at which a number of men could exercise at the same time, was designed. The machine was made by the patients undergoing treatment and instruction in trades in the Military Orthopædic Hospital, London, and was supplied to the various treatment centres.*

Special scales of equipment for military orthopædic hospitals were introduced in consultation with the Inspector of Military Orthopædics and other experts.

During the war a large number of special splints and fracture apparatus was designed for the treatment of compound fractures complicated with extensive septic wounds.† An exhibition of splints and suspension and extension apparatus for the treatment and transport of fractures was held at the Royal Society of Medicine in October, 1915. The exhibits attracted much attention. Scale drawings were made from which the apparatus could be constructed and installed in various military hospitals both at home and overseas. A universal suspension apparatus and a net frame were designed by means of which patients suffering from fractures complicated with extensive wounds could be suspended and their wounds treated without interfering with the extension of the fractured limb. Patterns were made by one of the war hospital supply depôts and were supplied to military hospitals in France and military orthopædic hospitals in the United Kingdom to enable further sets of the apparatus to be manufactured locally. At the request of the Director-General of Medical Services in France, with a view to standardization of patterns, the consulting surgeons there rendered valuable assistance in 1917 in considering the most suitable designs

* *See* Appendix E, Table XVIII.

† Some of these are described in a "Memorandum on the Treatment of Injuries in War" officially published in July, 1915, and further modifications were published in the *British Medical Journal* of 16th December, 1916. A new edition of the Memorandum was published in January, 1918, under the title "Manual of Injuries and Diseases of War."

and patterns of splints and apparatus for general use, and eliminating the infinite variety that had accumulated in depôts to suit individual tastes. Fifty varieties were selected, and a reserve stock of about 200,000 was maintained in the Army Medical Reserve Store at Woolwich to meet demands from depôts and hospitals overseas.* The standard patterns were adhered to as far as possible, but special designs were authorized and supplied to meet the requirements of special cases. Splint-making shops were established at Boulogne, Calais, Alexandria, and Salonika for the manufacture of all kinds of splints and similar appliances which could be made of wood, metal, and leather. These workshops were fitted with the requisite plant and tools, and experienced workmen employed in them. Although nearly a million and a half standard splints purchased under contract in England were supplied to the armies in the field, these factories largely supplemented the supplies, and, in addition, turned out large numbers of splints of special patterns and designs. Similar splint shops were subsequently established in the orthopædic hospitals in the United Kingdom.

Cutler's shops for the repair and sharpening of surgical instruments were established at Boulogne, Calais, Rouen, Abbeville, Alexandria, and Salonika. Each shop was fitted with the requisite power, plant (grindstone, polishing and buffing wheels, anvils, lathes, filing and fitting benches), and tools, and experienced instrument makers were employed. Electro-plating plants were also installed at the workshops at Abbeville, Calais, and Alexandria. A large amount of repair work was carried out in these shops, and by means of them surgical instruments in use at casualty clearing stations, general hospitals, stationary hospitals, and other medical units in the field were repaired, sharpened and returned without the delay and expense which would have been involved by sending the instruments to contractors in England for repair.

By June, 1918, there was a large number of disabled soldiers on furlough waiting admission to hospitals for the fitting of artificial limbs. Experience showed that when artificial limbs were provided immediately after the stumps were healed the shrinkage of the stump quickly rendered a change of bucket necessary. It was found that this shrinkage did not definitely progress until the stump was brought into use, and it was found necessary, therefore, to provide a simple temporary limb pending the completion of the shrinkage of the stump. At a conference held at the medical department of the War Office at the end

* Some of the more commonly used splints are enumerated in Appendix E, Table XVII.

of August, 1918, it was decided that the plaster pylon was the most suitable for this purpose as well as the simplest to make and the easiest to adjust or re-make when necessary. A memorandum was consequently published giving details of the method of manufacture of the pylon; officers from over 100 military hospitals were sent to various centres for instruction in making pylons, and the necessary wooden base blocks, side bars, struts, rubber heel pads, felt, flannel, muslin, webbing, plaster of Paris, buckles, and screws for their manufacture were supplied to these hospitals. At an Inter-Allied Conference on the after-care of disabled men held in Rome in October, 1919, the general opinion expressed was to the effect that these temporary limbs should be regarded as a therapeutic measure for the preparation of the stump rather than as a means of locomotion, and that the plaster pylon accurately fitted to individual stumps was the best form of temporary limb.

With regard to drugs, it was foreseen in the early days of the war that it would be necessary not only to prohibit the export of certain drugs but also to encourage their manufacture in this country in order to guard against a shortage. Both these steps were taken, with the result that there was at no time any actual shortage of essential supplies, although there were temporary difficulties from time to time in obtaining what was required, and in some instances substitutes had to be adopted. Thus, owing to the necessity of allocating the total production of glycerine for the manufacture of explosives, the supply of glycerine for medicinal purposes was stopped by the Ministry of Munitions in February, 1917, and substitutes such as glucose and treacle had to be found for those pharmacopœia preparations which contained glycerine.* The use of carbolic and picric acids for surgical and antiseptic purposes was also restricted owing to the urgent need of these substances for explosives, and the employment of cresols in part substitution was adopted. Shortage in the supply of lard, oils and fats for food and the necessity for reserving most of the available supply of the highest grade of castor oil for aeroplanes made it necessary to find substitutes for these articles.

British manufacturers were encouraged to manufacture synthetic coal-tar derivatives such as aspirin, antipyrin, phenacetin, salicylate of sodium, and novocain, and fine chemicals such as atropine, morphia, emetine, and permanganate of potash, all of which before the war were largely imported from Germany, with the result that not only were sufficient quantities produced in this country to meet the needs of the army, but the high prices ruling in the earlier part of the war

* The use of glycerine was restored in January, 1919.

were very materially reduced. Care was taken to ensure that in all cases the B.P. standard of purity was adhered to. Ether and chloroform for anæsthetic purposes were required in such enormous quantities that the Customs authorities were approached and special facilities were granted to the limited number of manufacturers of these drugs for augmenting their plant in order to increase the output to meet requirements.

Not only did contractors keep heavy stocks of drugs to meet current requirements, but, in order to meet urgent demands from the armies in the field, a reserve of some 6,000 cases of the more important drugs was held ready for immediate despatch in the Army Medical Reserve Store, Woolwich. A very large reserve of some 250 million tablets was also maintained in the Reserve Store. The number of tablets of compressed drugs issued during the war amounted to 1,080 millions, in addition to a very large number of tubes of hypodermic and ophthalmic tablets.

Quinine was in great demand and was very freely used as a prophylactic in the war areas where malaria was prevalent. It was mainly issued in the form of the four principal salts, sulphate, bisulphate, hydrochloride and bihydrochloride, a considerable portion being in tablet form. The demand increased with the increase of the forces operating in malarial districts until during the year 1916 the total issues exceeded twenty-one tons or nearly sixty-six million five-grain doses, while during the earlier part of the malarial season of 1917 the average amount supplied monthly was about 12,500 lb., or over five and a half tons. In 1918 the average monthly consumption amounted to some 10,000 lb. Considerable difficulty was experienced in obtaining this enormous quantity of quinine, and it was found necessary to have all stocks of the drug held in this country declared and to requisition nearly forty tons under the Defence of the Realm Regulations. A consignment of 30,000 lb. was also obtained from India and sent direct to Salonika.

Cases of indiscriminate sales by chemists and others of narcotic and other poisonous drugs to officers and soldiers having been brought to notice, the Army Council, in view of the inadequacy of the Pharmacy Acts for dealing effectively with such cases, decided to take steps under the Defence of the Realm (Consolidation) Regulations, 1914. An Army Council order was consequently promulgated on the 11th May, 1916, with the concurrence of the Admiralty, prohibiting the sale of certain poisonous drugs to or for any member of His Majesty's Forces unless ordered for him by a registered medical practitioner on a written prescription duly signed and dated and

marked with the words "not to be repeated." By Army Council Instructions, dated 5th June and 8th August, 1918, the order dated 11th May, 1916, was further amended and acetanilidum and phenacetin and any salts, preparations, derivatives, or admixtures, prepared from or with either of these drugs, were added to the schedule.

The principal general anæsthetics employed for surgical operations were methylated ether, methylated chloroform, ethyl chloride, and nitrous oxide gas. Notwithstanding the statements to the contrary, which appeared in the public press and elsewhere, at no time was there any shortage, but special steps had to be taken, as noted above, to ensure adequate quantities being available to meet the very large demands submitted from depôts of medical stores and military hospitals. The total amounts of ether and chloroform issued during the five years of the war were 413,198 lb. and 249,341 lb. respectively. The average monthly issues during the first seven months of 1917 amounted to 7,013 lb. of ether and 4,901 lb. of chloroform. The demands from France for ether were specially heavy, and amounted at one time, in September and October, 1918, to 3,000 lb. per week, due to its being largely used in preference to chloroform.

In order to meet the special requirements of the army, where anæsthetics have sometimes to be stored for a considerable time, a higher standard of purity of ether and chloroform than that usually required by civil hospitals was deemed to be necessary, and, acting upon the advice of the Council of the Section of Anæsthetics of the Royal Society of Medicine, steps were taken to ensure that all supplies, in addition to complying with the strict requirements of the British Pharmacopœia, should pass two additional tests of purity.

A new scale of anæsthetic outfit for operation theatres was adopted,* and a new form for recording the administration of anæsthetics introduced.

In 1917 the demand for nitrous oxide gas and oxygen rapidly increased, as they proved more satisfactory than the other anæsthetics in cases suffering from severe shock. By the middle of that year the monthly requirements were 78,500 cubic feet of oxygen and 300,000 gallons of nitrous oxide gas. The increasing use of these gases involved the issue of a very large number of cylinders, which had to be specially manufactured; but, owing to the demands for steel for munitions, some difficulty was experienced in obtaining sufficient cylinders to meet requirements. Over 14,000 oxygen cylinders and over 8,000 nitrous oxide cylinders of varying capacity were in

* *See* Appendix E, Table XIX.

circulation for medical purposes by the end of 1917, and in 1918 a further 7,500 oxygen cylinders and 3,000 additional nitrous oxide cylinders were purchased. Orders for 10,000 cylinders were cancelled on the signing of the Armistice. The oxygen cylinders supplied included 4,000 of a light type intended for use in the field with Haldane's oxygen inhalation apparatus.*

Oxygen was supplied to home hospitals by the British Oxygen Co., while in France cylinders were refilled by French firms. All the other theatres of war were supplied through the Army Medical Store at Woolwich, empty cylinders being returned to this country for refilling as they became available. All the nitrous oxide gas required at home and overseas was also supplied through the Army Medical Stores.

The provision of oxygen as a therapeutic agent for use in the army during the war was never on a thoroughly satisfactory basis. Prior to 1914 the employment of oxygen in clinical medicine was extremely limited. Consequently the demands from the medical profession were not sufficient to stimulate industrial effort for production and distribution on a large scale. Gaseous oxygen under pressure in large heavy steel cylinders was supplied and the user was obliged to accept it in these cumbersome containers. The excessive weight was a serious disadvantage from the point of view of transport and handling. There was often great waste of gas due to the want of knowledge on the part of those administering it and also for the want of a device to control the flow and measure the quantity which it was intended the patient should receive.† This costly, extravagant and inconvenient method of distribution seemed to meet the demands of the civil population and that of the army during the early days of the war, but when the Germans used poison gas the need for oxygen on a large scale in the advanced medical units became acute and the problem of how the requirements could be met was difficult and anxious. Whether the necessary quantities of cylinders could be produced became a serious question. The matter was referred to the medical stores committee of the department of the Surveyor-General of Supply who, after considerable investigation and experiment, arrived at the conclusion that oxygen in a liquid form offered a solution of the difficulty, provided a suitable container in the form of a vacuum or thermos flask could be found. Glass containers, although specially protected, were found to be too fragile to withstand the rough usage inseparable from active service conditions, and, after numerous experiments

* This was a special apparatus designed by Dr. J. S. Haldane, of Oxford. Over 450 sets were supplied to the medical services overseas.

† The Haldane apparatus was designed to meet these requirements.

in the workshop, satisfactory metal vacuum containers were produced. Before the signing of the Armistice in November, 1918, arrangements had been completed to send a substantial amount of liquid oxygen to France in large containers with a number of tested vaporizers for use on the Western Front. A R.A.M.C. officer specially instructed in all details appertaining to this subject was in readiness to proceed in charge. Arrangements for a regular supply of liquid oxygen to be sent to this officer had also been made. But when hostilities ceased the necessity for oxygen in the advanced line medical units disappeared. The matter, however, was not lost sight of, and certain points in connection with it were from time to time referred to the Oxygen Research Committee of the Department of Scientific and Industrial Research for investigation under peace conditions.

Provision for dealing with possible cholera outbreaks was made early in the war, and excellent cholera outfits were devised by Captain A. White-Robertson, R.A.M.C., for the treatment of cases on the lines recommended by Lieut.-Colonel Sir Leonard Rogers of the Indian Medical Service. Each of these outfits contained sufficient apparatus, chemicals and drugs, packed in two portable cases, to deal with a hundred cases of the disease. 545 outfits were distributed to the various areas of operations, namely, 62 to France, 112 to Egypt and the Mediterranean, 170 to Mesopotamia, 18 to Italy, 163 to North Russia, and 22 to Salonika. A reserve of 12 outfits was maintained in the Army Medical Store at Woolwich.* In addition to the outfits a reserve of expendible contents and certain hospital necessaries for the treatment of the disease were supplied to the base depôts of medical stores overseas.

The quantity of vaccines issued during the five years of the war amounted to over 34 million cubic centimetres, of which more than 24 million were for typhoid and paratyphoid, nearly 7¼ millions for cholera, and well over a million for influenza. Altogether some 24 varieties of vaccines were prepared, practically the whole of which were manufactured in the vaccine department of the Royal Army Medical College, thus saving the State the expenditure of many thousands of pounds sterling.

Over 12 million doses of various sera were also issued,† 11 millions of which were anti-tetanic serum. In view of the experience gained from the study of tetanus during the war, it was considered necessary to extend greatly the use of anti-tetanic serum as a prophylactic, and this necessitated the

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* *See* Appendix E, Table XX.

† *See* Appendix E, Tables XXI and XXII.

preparation of a scheme for its distribution to the hospitals at home, as well as to units in the field. 190,000 phials of prophylactic sera for gas gangrene were prepared containing anti-bodies to *B. Welchii*, *Vibrion Septique* and *Tetanus*. A series of five varieties of high-potency sera was also provided, both monovalent and polyvalent. The actual issue of the bulk of these anti-gas-gangrene sera, however, was not made until the eve of the Armistice. Early in the year 1918 arrangements were completed through the Medical Research Committee for the provision of anti-endotoxic meningococcus serum, prepared at Cambridge, for the treatment of cerebro-spinal fever. The serum was supplied in all cases of cerebro-spinal fever occurring in the troops stationed in Great Britain. This supply was in addition to anti-meningococcus serum provided by the Lister Institute for issue to the overseas forces. For the treatment of influenza cases in the army, 10,046 phials of a special anti-streptococcus serum were issued, in the production of which cultures were employed prepared from strains isolated from actual cases of influenza occurring in France. During the year 1918 a Central Military Laboratory was established at Cambridge, under the supervision of Colonel G. Sims Woodhead, for the manufacture, standardization and supply of the several reagents necessary in the conduct of the Wassermann reaction for syphilis. Some twenty hospital laboratories, especially selected in the Home commands, were then supplied with these reagents with a view to securing uniformity in the testing of suspected blood sera and cerebro-spinal fluids, and adopting an official standard test. This work was in full operation by July, 1918.

The results obtained in France by Carrel's method of irrigating wounds with Dakin's solution proved so satisfactory that arrangements were made to continue the treatment on hospital ships and ambulance trains as well as in hospitals at home. A pamphlet of instructions on the subject was prepared.

Shortly after the outbreak of war the medical services were faced with the prospect of a serious shortage in the supply of scientific glassware and the increasing demands of glassware for medical, bacteriological, pathological and chemical purposes had to be met chiefly from the stocks of foreign-made articles held by merchants in this country. The amount produced in the United Kingdom was very limited, and efforts were made by various scientific bodies, such as the Institute of Chemistry, the Department of Glass Technology, Sheffield University, and the Government Department of Scientific and Industrial Research, to foster the manufacture of heat-resisting and special glassware for scientific purposes. The Optical Munitions Glassware Department of the Ministry of Munitions organized

the trade and undertook to supply the medical services with the glassware necessary to meet requirements. Although delays occurred and to a certain extent inferior substitutes had to be accepted, an adequate and regular supply was maintained and no serious shortage was experienced.

In connection with instructions promulgated in June, 1918, regarding the "early treatment of venereal disease," arrangements were made for the supply of the necessary materials and apparatus, and over five million capsules of calomel cream were issued for army use up to the end of October, 1919.

From time to time advice was given to the Central Prisoners of War Committee of the British Red Cross Society and Order of St. John as to what medical stores and invalid comforts should be sent to prisoners of war camps in enemy and neutral countries.

In 1915 Colonel Sir Edward Ward was appointed Director-General of Voluntary Organizations to co-ordinate the efforts of the numerous voluntary organizations, not under the British Red Cross Society, which were engaged in making various articles for the comfort of patients in military hospitals, but were not authorized for supply from official sources, such as bed-jackets, bed-socks, dressing gowns, hospital bags, pyjamas, slings, felt slippers, sphagnum moss dressings, operation swabs, specially prepared bandages, and so on. He was assisted in this work by Mr. A. Hutchings. The organization rendered invaluable service and added greatly to the comfort of the patients in military hospitals.* The British Red Cross Society and Order of St. John also supplied vast quantities of similar comforts to military hospitals in addition to what they supplied to Red Cross hospitals, and their gifts were very highly appreciated.

In addition to the War Office X-ray and electro-medical committees, to which reference has already been made, various other committees and specialists were appointed and freely consulted as to the necessity or desirability of supplying articles of medical and surgical equipment which were asked for but which were not in general demand, and for advising on the very large number of new patterns and inventions and new methods of treatment requiring investigation and trial.† This entailed much work, involving as it did numerous interviews, the getting out of specifications and patterns, arrangements for manufacture, and so on.

When the department of the Surveyor-General of Supply was organized in 1917 with the object of co-ordinating the

* *See* Chapter XI.

† *See* Appendix E, Table XXIII.

commercial side of the business of supplying the army, one of its committees, consisting of a commercial member as chairman, a representative of the Director-General of the Army Medical Service, a representative of the Director of Army Contracts, and a secretary, was appointed to deal with the supply of medical stores. The duties of this committee were to examine and, if advisable, suggest revision of demands in the light of available information as to stocks, rate of consumption and available transport facilities; to consider the possible revision of patterns and specifications with a view to securing greater economy or removing difficulties of supply; to consider the adequacy of provision for existing or probable future requirements, and to make suggestions as to meeting such requirements.*

With a view to ensuring the proper accounting for medical stores, the exercise of strict economy and foresight in making demands and the prevention of undue accumulation, extravagance and waste, some fifty circulars and fifty-three Army Council Instructions dealing with supply of medical and surgical stores were issued during the war.†

After the outbreak of war, the duty of accounting for the receipt and issue of medical and surgical stores at military hospitals became a very difficult problem owing to the withdrawal of the trained staffs for service in the field. They were replaced by men who knew little or nothing of the method of accounting for medical stores, and it was found practically impossible to compile the necessary returns until they became conversant with the regulations and army forms used for accounts. At first instructions were issued for accounts to be kept for non-consumable stores only, thus safe-guarding as far as possible the most important class of stores from a financial point of view. In March, 1916, however, instructions were issued for the full accounting of all receipts and issues to be resumed as in peace time not only for hospitals but for all units at home.‡

In order to cope with the work involved in checking these accounts it became necessary to establish a special audit section in the directorate of medical services for the audit of the returns of medical stores, a difficult matter with a small and untrained staff, more especially as the returns were largely of a technical nature. Further, the manner in which the majority of the returns were compiled necessitated an immense number

* Mr. W. J. Uglow Woolcock first represented the Director of Army Contracts on this committee and was subsequently appointed chairman.

† *See* Appendix E, Table XXIV.

‡ A.C.I. 629 and 647 of 1916.

of " observations," in some instances close on 300, being sent back to accounting units.

A special cash accounts section was also organized to receive, register, file, audit, and prepare for payment contractors' claims for medical and surgical stores, and to conduct the correspondence incidental to their settlement.*

The investigation and preparation for payment of contractors' applications for advance payments was another important duty. An average of over 48,000 contractors' claims were dealt with each year. The section also revised and kept up to date the " Priced List of Medical Stores," and maintained the War Office stock ledgers, the record of receipts and issues of War Office stock, and dealt with other financial matters arising out of the purchase of medical and surgical stores. The staff of the cash accounts section was 23, nearly all of whom joined the medical department of the War Office without previous experience in accounting. The majority, too, had had no office training, and it is much to their credit that the work of accounting was so accurately performed. The system of ledger keeping for cash accounts adopted was so complete and satisfactory that it was made use of by the Finance and Audit Branch of the War Office, who found it unnecessary to keep a similar detailed record in their branch.

During the first year and a half of the war, local purchase of medical stores had to be largely resorted to, and in the

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* In the audit of each account the contract rates were checked, quotations " agreed," prices and references to catalogues and price lists were verified, and rates which were not included in any of the foregoing categories were settled; percentages, discounts, extensions and additions were computed, and the necessary adjustments were made in the invoices. Temporary deductions for " costings " were made and recorded, and these were finally adjusted on receipt of the report of the Contracts Department. Carriage and other charges were verified with vouchers, the rates for packing cases, bottles and other containers were checked, questions involving the interpretation of contracts were settled or referred to the Director of Army Contracts, and the contractors' claims were finally cross-checked with the certificates of stores credit. Duplicate claims were watched for, and all accounts were carefully filed after payment. The necessary certificates of receipt of stores were obtained from the various hospitals and depôts at home and abroad to vouch payment of contractors' claims. All special contracts in their subsequent amendments were recorded and indexed in the contract ledgers; particulars of deliveries, rejections, deficiencies, payments, deductions for costings and other adjustments were also recorded, and the ledger finally balanced for each contract. There were 18 of these ledgers in use. An invoice book was kept, recording the individual value and total of contractors' claims day by day. Systematic reminders were sent to officers in charge when documents connected with the settlement of accounts had not been returned and the return of invoices duly recorded. Contractors were notified of discrepancies in supply from shortages, breakages, non-delivery of stores, inaccurate descriptions, omissions from invoices, and so on, lost cases were traced, and all these discrepancies finally adjusted by credit, replacement, or " write off." Credit for returned empties and stores was secured and appropriate empties ledgers duly kept.

financial year 1915-16 the expenditure under this head amounted to £309,682. This was due mainly to three causes. On mobilization, the cost of the initial outfit of medical and surgical equipment for the territorial force general hospitals was met by local purchase; the cost of dental treatment was made a local charge before the establishment of army dental workshops and the appointment of army dental surgeons; and the rapid raising of the new armies necessitated the local purchase of medical stores from the nearest available source. An Army Council Instruction was issued on the subject in 1916, and this, combined with the change of the system of dental treatment, was responsible for the reduction of local purchases to £84,303 in 1916-17, with further reductions in subsequent years of the war.

In addition to supplying medical stores to the armies in the field and all the hospitals at home and abroad, heavy demands for medical stores required by the India Office, Dominion contingents, Air Ministry, Ministry of Pensions, Ministry of National Service, Ministry of Health and other Government departments, the United States Army and the Portuguese, Belgian, and Serbian Governments were met. The Local Government Board and the Board of Control in many instances were given the surplus medical and surgical equipment and stores which the Army Medical Service had in poor law institutions and asylums when military hospitals opened in them were demobilized.

During the course of the war, drugs and dressings were also issued free from medical units in the field to the civilian population in areas occupied by the 1st, 2nd, and 3rd Armies in France. In the 1st Army area about 245 patients were treated daily at an approximate daily cost of £4 6*s*. Attendance and treatment were given by R.A.M.C. officers practically whenever and wherever it was asked for, owing to the poverty of the applicants and to the limited number of French doctors available. Fewer cases were treated in the areas occupied by the 2nd and 3rd Armies, treatment being limited in these areas mainly to cases of accidents occurring in the proximity of medical units. This service to the French civil population was greatly appreciated. It stimulated a spirit of friendship which was of much value and assistance, and, in 1916, it was decided to continue free treatment of this kind till the end of the war. After the signing of the Armistice it was discontinued, except for cases of emergency, in the areas occupied by the lines of communication.

In addition to this service to the French, 3,559 cases of medical and surgical stores, amounting to £55,738 in value, were supplied,

in September, 1918, to the British supply mission at Archangel for the use of the civil population there; and considerable quantities of medical and surgical stores were supplied in 1919 from home and overseas depôts of medical stores to allied forces in Russia and Siberia. These stores included medical and surgical equipment for medical units, regimental medical and surgical equipment, and advanced and base depôts of medical stores.

In August, 1919, 171 packages of medical and surgical stores, valued at about £4,500, were supplied from No. 14 Base Depôt of Medical Stores in Italy, at the urgent request of the Inter-Allied Food Mission, Vienna, to meet the pressing needs of the civil hospitals in Vienna and Budapest.

Immediately after the signing of the Armistice steps were taken to effect economy and reduce expenditure. The contracts branch was asked to cancel as far as possible outstanding contracts for medical supplies not required in view of the altered conditions; in addition to several depôts established at home, five special depôts were established overseas at Boulogne, Calais, Etaples, Abbeville, and Rouen for the reception of stores handed in by units on demobilization; stocks, surplus to requirements at home and overseas, were ascertained and arrangements were made for their redistribution where required, instead of meeting demands by purchase; obvious surplus stocks were declared as such to the Surplus Government Property Disposal Board for sale; medical stores, estimated at £276,000, for General Denikin's forces in South Russia were provided from surpluses in England, France, Malta, Egypt, Salonika, and Italy; the mobilization field medical equipment of the Interim Army was provided from existing stocks, and from serviceable equipment brought home by cadres of units returning from overseas.

Arrangements were made at the same time to enable serving and demobilized officers of the R.A.M.C. and dental surgeons to purchase surgical and dental instruments and appliances, X-ray equipment, and aseptic furniture, which were surplus to army requirements. Stocks were held available for inspection in London, Woolwich, Liverpool, Bristol, Northampton, York, Portsmouth, Edinburgh, and Dublin. Large numbers of officers and ex-officers took advantage of this opportunity to secure for their own use on advantageous terms articles necessary for their practice on demobilization.

It will be seen from this account of the supply of medical and surgical equipment and stores during the war that the Army Medical Department was able at all times to meet the heavy demands made on it, and that there was no lack at any

time of the essential remedies and appliances required for the treatment of the sick and wounded. The task was one of extreme difficulty especially in the early days of the war; and new difficulties were constantly arising. Enormous demands for stores and equipment of all kinds had to be complied with to meet the sudden and frequent expansion of hospital beds both at home and overseas. There was a multiplicity of indents marked "urgent," many of them for excessive quantities of stores, the real necessity for which it was difficult or impossible for the central department to determine, although it was felt that the demand depended in many cases on the desire of the indenting authority to anticipate requirements or to meet a shortage which want of foresight had rendered imminent. Excessive demands were difficult to meet from a depleted market. Certain articles such as those usually supplied from foreign countries could only be obtained in restricted quantities until arrangements were made to manufacture them at home. Contractors often failed to keep to time with their deliveries owing to scarcity of material and labour; shipping was not always available, and transit of stores by railway was sometimes delayed. Another source of delay was insufficient description of the article indented for, necessitating enquiries as to its exact nature. Notwithstanding these great and increasing difficulties the maintenance of the supply of medical and surgical equipment and stores was one of the most brilliant achievements of the medical services at the War Office during the war. This result could not have been attained without the cordial co-operation of the medical supplies branch of the Contracts Department, the loyal and patriotic support of the manufacturing and contracting firms, and the assistance of the expert committees.

CHAPTER X

SANITARY ORGANIZATION IN THE UNITED KINGDOM

THE sanitary problems which the medical services encountered at the beginning of the war teemed with difficulties. Situations arose of which the military and civil sanitary authorities had no previous experience and for which legislation affecting public health had made no provision. Apart from the rapid accumulation of troops in camps throughout the country, large numbers of soldiers had to be billeted for the first time, at any rate in living generations, in the houses of the civil population, and the danger of the spread of infectious disease amongst soldiers and civilians alike caused much anxiety. Both camps and billets overflowed with recruits of the new armies who were as yet untrained in army sanitation, and, in many cases, the medical officers in charge of the new units were equally inexperienced. It is no matter of surprise, therefore, to find that numerous complaints reached the War Office in the earliest stages of the war regarding the conditions under which young soldiers were being housed and fed, and regarding outbreaks of preventible disease amongst them. But, although most of the complaints fortunately proved on investigation to be unfounded or much exaggerated, the need of active measures to meet the sanitary situation was undoubtedly great. Before the war the number of troops serving in the garrisons at home varied but slightly from year to year. They were housed in permanent barracks and camps, and it was only during army manœuvres, when they were temporarily quartered in civil sanitary districts, that military sanitary authorities came in touch with certain of the civil sanitary authorities in England. The arrangements then made were a matter of local agreement and it was quite exceptional for the Army Council and the Local Government Board to intervene with special arrangements made by higher authority. Legislation, as affecting the relationship between civil and military sanitary authority, was broadly to the effect that War Department premises and the individuals in occupation of them were outside the sphere of the local civil sanitary authorities.* The War Office made its own arrangements for the

* *See* Sec. 327, Public Health Act, 1875; Sec. 9, Housing of Working Classes Act, 1885; Sec. 15, Infectious Disease (Notification) Act, 1889.

sanitary administration of barracks and camps, including water supply, sewerage and disposal of refuse, sewage, and so on; civil medical officers of health were not entitled to receive notification of infectious disease occurring in War Department premises, and measures of isolation, disinfection, and other means of preventing the spread of infectious disease in such cases were legally no concern of theirs. In most cases, however, working arrangements of a more or less satisfactory kind were in operation between the local military and civil sanitary officers. Thus cases of infectious disease amongst soldiers and their families were frequently admitted into the civil isolation hospitals by mutual consent, and the general view of the Local Government Board and the Army Council was that there should be the fullest interchange of information regarding the prevalence of infectious diseases in the military and civil populations.

The outbreak of war at once transferred the question of co-operation between the military and civil sanitary authorities from local arrangements in a few districts only to the consideration of general measures which would be applicable to all areas throughout the country; and, for this purpose, the Director-General of the Army Medical Service, immediately war was declared, put himself into communication with Sir Arthur Newsholme, who was then the medical officer to the Local Government Board. From that time onwards, the Local Government Board and its medical services worked in close association with the War Office in all matters relating to the sanitation of billets and camps,* as well as undertaking the organization of a system of supervision over the preparation of the supplies of food for the army.

All commands at home were instructed by Army Council letters of the 8th August, 12th September, and 10th October, 1914, to pay special attention to the sanitation of camps and billets, and, before troops marched into billeting areas, to consult the local medical officers of health and sanitary authorities with a view to obtaining information regarding infectious diseases, water supplies, drainage, latrine accommodation, and sanitary conditions generally amongst the civil population. The Local Government Board at the same time, on the 31st August, 1914, issued a circular letter to all medical officers of health, setting out the lines of action on which they should co-operate with the military sanitary services. Each medical officer of health was called upon to place himself in communication with the local military authorities, offer his services, and

* This action applies equally to the Local Government Board of Scotland and the Public Health Department of the Local Government Board in Ireland

give information and assistance to military sanitary officers regarding the water supplies, the disposal of refuse, the drainage and conservancy arrangements, and methods of control of infectious disease in his district. The sanitary inspectors were to help, and a system of inter-notification of infectious disease between the civil and military sanitary authorities was established.* Attention was also drawn to the value of anti-typhoid inoculation, and the probable need of increased isolation hospital accommodation, especially for small-pox and enteric fever. The Local Government Board also offered the services of its medical staff to the medical officers of health of civil sanitary areas and arranged for local visits by its medical inspectors in connection with the housing of troops.†

In a subsequent letter to sanitary authorities of the 21st October, 1914, the duties of medical officers of health of districts in which troops were quartered were still further emphasized by the Local Government Board. The extension of water mains and sewers, the provision of latrines and baths, hospital accommodation for cases of infectious disease, disinfection of clothing and blankets, destruction of refuse and special scavenging arrangements were regarded as urgent matters which the civil sanitary authorities should deal with whenever their districts were occupied by troops. The county medical officers of health were also called upon to assist by placing at the disposal of the military authorities information regarding undesirable localities, county water supplies, laboratories and isolation hospitals.

But the direction in which medical officers of health were in a position to assist the military authorities most was in connection with billeting. The arrangements for billeting were in the hands of the Chief Constables and police authorities. In the earlier stages of the war there was lack of co-operation between them and the sanitary authorities. Neither the civil nor the military medical officers were invariably kept informed of the movements of troops, and billets were frequently arranged without reference to them. The result was that in several instances poor class dwellings and insanitary premises were often occupied as billets, and at times also the overcrowding was considerable. One great difficulty was the insufficiency of

* Notification of infectious diseases in War Office premises was made compulsory in 1916 by the Local Government (Emergency Provisions) Act of that year, which suspended Sec. 15 of the Infectious Disease (Notification) Act of 1889.

† Between August, 1914, and March, 1915, twelve medical inspectors of the Local Government Board "were almost completely engaged in visiting sanitary districts where troops were located." (Supplement to 44th Annual Report of L.G.B., p. v.)

latrine accommodation in places where the population of a town suddenly expanded to abnormal dimensions. In Lewes, for example, upwards of 11,000 recruits arrived almost without warning in one day.

Although the instructions, noted above, required the civil sanitary authorities to provide bucket latrines of the camp type at suitable sites for troops in billets, these sanitary constructions were not and could not be ready, unless sufficient warning had been given. This was specially felt in Durham and Northumberland, where troops were billeted in cottages with privy middens instead of water-closets. Want of co-operation between the police and the sanitary officers was also noticeable in connection with water supplies. Empty houses and public buildings were often allotted as billets before water had been laid on. Again, there was much lack of discrimination in the selection of houses. Small houses with large families, houses occupied by women only, dirty and dilapidated empty houses, and even dairy premises, were allotted by the police authorities.

The Army Council had drawn the attention of commands, in their letter of the 10th October, to the necessity of referring to the civil medical officers of health of the districts in which troops were to be quartered before the billets were arranged, but, notwithstanding the constant efforts of the War Office and Local Government Board authorities, many sanitary defects continued to exist and led to definite rules as to billeting being issued with Army Orders on the 1st December, 1914. These required billeting officers to utilize the houses of substantial householders first and to avoid the poorer districts; not more than one man to every two rooms, exclusive of kitchen and offices, were to be billeted in a dwelling house; and occupants were not to be deprived of bedrooms habitually used by them. In large buildings a minimum of 40 superficial feet and 400 cubic feet was to be the allowance to each man. Field latrines on a scale of four seats per 100 men were to be constructed wherever local latrine accommodation was insufficient, and all unsuitable and insanitary billets or billets infested with insects were to be immediately vacated.

While the assistance of the Local Government Board was freely obtained in dealing with the local sanitary conditions on the above lines through the medical officers of health and their medical inspectors, Colonel W. H. Horrocks, the expert in sanitation on the Army Medical Advisory Board, was actively engaged in visiting camps and billets, and ensuring that practical and, if necessary, drastic measures were taken to improve their sanitary condition. From the first Colonel Horrocks had been dealing with the

selection and laying out of new camps and with various sanitary questions connected with the establishment of the territorial force general hospitals, but, owing to the complaints which were being made regarding the billeting arrangements, he was instructed to devote his attention to these and make special inspections of them in association with the Local Government Board's inspectors. Colonel Sir William Leishman, the expert in pathology on the Advisory Medical Board, was also instructed to visit the various training centres with a view to raising the standard of preventive inoculations and establishing laboratories for detecting infective diseases by bacteriological methods.

In September, 1914, enquiries were also made as to the extent to which the sanitary officers of the Territorial Force R.A.M.C. had been mobilized for duty, and attention was drawn to the necessity of inspecting billets and camps occupied by refugees and prisoners of war. One of the medical inspectors of the Local Government Board was sent to inspect these places, and commands at home were instructed to do everything in their power to give effect to the desire of the Local Government Board to assist in the maintenance of a thorough supervision over the sanitary conditions in the country caused by a state of war.

Such, generally, were the earlier efforts in the first months of the war to prevent outbreaks of disease amongst the troops. The chief difficulties with which the medical services had to contend, it will be noted, were brought about by the occupation of billets before the sanitary authorities had an opportunity of declaring their suitability or the reverse, before sanitary constructions were ready, and especially before a satisfactory system of conservancy and scavenging had been arranged by contract. Similar difficulties arose in connection with the occupation of camps ; so much so that the medical department of the War Office at the beginning of September drew the attention of the quartering, works, and finance branches to the necessity of taking immediate steps to have the defects, due to defective conservancy, remedied. The experience of the United States troops in similar camps in Virginia and Florida, during the war with Spain in 1898, had not been forgotten ; and reports which were reaching the War Office regarding the state of the camps in the United Kingdom, and especially the prevalence of flies in them, justified the fear that enteric fever, which had decimated the American camps, might occur amongst the troops in the camps at home under the conditions then prevailing. The attention of commands was accordingly directed at first to effecting improvements in camp sanitation.

The number of specialist sanitary officers was increased and a varying number of men of the London Sanitary Companies were allotted to commands and posted to units.

As regards specialist sanitary officers, the peace organization, as already noted, provided for one only in each command; but with the immense additions to the troops after the declaration of war it was impossible for him to exercise supervision over all. A reorganization of the sanitary arrangements was consequently made to meet the requirements of individual commands. In the Aldershot Command, where the number of troops in the first year of the war averaged some 130,000, as compared with 23,000 to 24,000 before the war, there was no special allotment of sanitary districts under specialist sanitary officers, but there was close co-operation between the specialist sanitary officer at command headquarters, the assistant directors of medical services in the two districts of Bramshott and Witley, the officers commanding the military hospitals, the officer in charge of the army school of sanitation, the laboratory of which was reopened in January, 1915, and the medical officers of health of eleven rural or urban sanitary districts.*

In the Eastern Command two specialist sanitary officers were employed in August, 1914, one at headquarters and in sanitary charge of the area south of the Thames, and the other at Colchester for the area north of the Thames. The number of troops in the Command rose from some 23,000 to an average of 350,000 or more, reaching at one time, in 1915, 600,000. For the purpose of sanitary administration, therefore, the Command was divided into six districts with sub-districts. Apart from the headquarters organization, to which an assistant sanitary officer had been appointed on the staff of the specialist sanitary officer of the Command, a specialist sanitary officer was appointed to each of the six districts, Bedford, Chatham, Colchester, Shorncliffe, Woolwich, and Sussex.† Sanitary officers were also appointed to the Harwich, Dover, Newhaven, and Woolwich garrisons, and to the home counties reserve brigade at Tunbridge Wells, as well as to camps at Tring (Halton Park), Shorncliffe, Sandwich, Crowborough, Seaford, Shoreham, and Croden. In addition to these there were specialist sanitary officers on the headquarters of the armies of

* These were Aldershot, Farnham Urban, Farnham Rural, Farnborough, Fleet, Guildford and Woking, Frimley, Hartley Wintney, Alton, Petersfield, and Haslemere. Dr. Routley, the Medical Officer of Health for the town of Aldershot, was specially in close touch with the Command headquarters throughout the whole period of the war.

† Sussex district had also an assistant sanitary officer.

the Central Force and of the 67th and 68th Divisions, when they came under the Eastern Command. Up till 1917, as many as five of the specialist sanitary officers in the Command were the civil medical officers of health of the districts to which they were appointed. In the earlier stages of the war, too, many medical officers of health were employed as sanitary officers in their own districts,* especially in the areas of the defended ports, and in several districts the local civil authorities placed the services of one or more of their sanitary inspectors at the disposal of the military authorities for the sanitary supervision of billets, so that the co-operation between the civil and military sanitary authorities in the Eastern Command, and the organization of sanitary work generally, became in this way very extensive and complete.

In the London District conditions differed considerably from those in the other commands, and with the exception of the sanitary construction and supervision of tented camps at Richmond Park and Tadworth and a hutted camp for 4,000 at Wimbledon in 1915, sanitary organization dealt mainly with inspections and sanitary improvements of the numerous military, territorial force, and private hospitals opened in London. The whole work was supervised from Command headquarters, to which Lieut.-Colonel Sir Shirley Murphy, formerly Medical Officer of Health to the London County Council and an officer of the sanitary service of the Territorial Force R.A.M.C., was appointed specialist sanitary officer with two assistants. He arranged a meeting with the medical officers of health of the 29 London sanitary authorities on the 20th August, 1914, when they all agreed to offer their services to the D.D.M.S. of the command without remuneration. They then met the D.D.M.S. and had definite duties assigned to them, including supervision of sanitary conditions of billets and encampments, reporting on sanitary defects and advising officers commanding units on sanitary matters, should an officer of the R.A.M.C. not have been appointed already to the unit. In some of the sanitary districts in London this arrangement was continued throughout the war. The work of preliminary inspection of premises was also greatly helped by the chief inspector† and his staff in the department of the London County Medical Officer of Health.

In the Northern Command, the normal garrison of which increased from some 6,000 regular and 6,000 reserve troops to a floating strength which varied between 200,000 and

* They were paid as civil practitioners.
† Mr. H. A. Jury.

400,000, the sanitary organization followed on much the same lines as in the Eastern Command. In addition to increasing the accommodation by constructing huts in barracks for this vast increase of troops, large camps were formed at Cannock Chase,* Clipstone,† Grantham,‡ Ripon,§ and Catterick,‖ as well as various smaller camps capable of holding one or two battalions each. Sanitary officers were appointed to each of these and also to the coast defence garrisons on the Tyne, Tees, Humber, Yorkshire, and Lincolnshire defences. The number of sanitary officers in the Command was thus increased from the one specialist at Command headquarters to fifteen.

In the Southern Command the employment of medical officers of health as the military specialist sanitary officers of sanitary districts was well exemplified, the medical officers of health for Hampshire, for Weymouth, the City of Bristol, Falmouth, and the Isle of Wight, becoming respectively the specialist sanitary officers for the Hampshire; Weymouth; Bristol, including Somerset and Gloucester; Falmouth, including West Cornwall; and the Isle of Wight military sanitary areas. Other sanitary areas with special sanitary officers to each were the Plymouth area, including Devonshire and part of Cornwall; two areas in Wiltshire, one for the Wyley Valley and the other for Salisbury Plain; Birmingham, including the counties of Warwick and Worcester; the Dorset training area; and the Oxford area, including Berkshire.

In the Western Command, sanitary organization, like hospital organization, was very much more centralized than in other commands. There was no division into definite sanitary areas until 1918; the whole of the sanitary work being supervised by the specialist sanitary officer at Command headquarters, who was appointed at the beginning of September, 1914, and remained at headquarters in Chester until the end of the war. The officer selected for this duty was the Medical Officer of Health for Chester—Major D. Rennett—who, like Sir Shirley Murphy in the London District, was one of the sanitary officers of the Territorial Force R.A.M.C. During 1917 and 1918 an assistant sanitary officer was appointed to help him. The local supervision of sanitary measures was entrusted to an officer on the staff of one of the local military hospitals, who was responsible to his commanding officer or to the senior medical officer of the garrison for

* Brocton Camp for 20,000, Rugeley Camp for 21,000.
† For 20,000.
‡ Harrowby and Belton Park Camps for 7,000 each.
§ For 28,000.
‖ Hipswell and Scotton Camps for 42,000.

carrying out sanitary inspections and seeing that all suitable sanitary measures were being enforced. From 1918 onwards this practice ceased. The Command was then mapped out into nine sanitary areas: No. 1 sanitary area included South Wales with headquarters at Cardiff; No. 2 and No. 3 sanitary areas included Mid-Wales with headquarters at Prees Heath and Oswestry; No. 4 area was North Wales with headquarters at Kinmel Park; No. 5 was the Chester area; No. 6 the Mersey defences; No. 7 Manchester with headquarters at Heaton Park; No. 8 Blackpool, and No. 9 Cumberland and Westmorland. A specialist sanitary officer was appointed to each with the exception of Nos. 2 and 3 which had one sanitary officer for both; and No. 5 and No. 9, which the Command specialist sanitary officer himself supervised.

In the Scottish Command for a short period after mobilization, sanitary supervision in the two territorial divisions was carried out by the specialist sanitary officers of the division, namely Lieut.-Colonel A. K. Chalmers, M.O.H., Glasgow, for the Lowland Division, and Lieut.-Colonel T. F. Dewar, one of the medical inspectors of the L.G.B. of Scotland, for the Highland Division; elsewhere by the medical officers of units. Soon after mobilization the Highland Division with its sanitary officer left the Command. The sanitary officer of the Lowland Division was demobilized at the request of his local authority, and sanitary supervision then devolved upon the D.A.D.M.S. at Command headquarters. At the beginning of December, 1914, a regular officer was appointed specialist sanitary officer for the Command, and, later, an assistant sanitary officer was also appointed. Sanitary control was centralized at Command headquarters where both these officers were stationed, but throughout the command wherever troops were concentrated medical areas were formed and the senior medical officer of each appointed one of his officers to supervise and control local sanitary measures. The number of areas varied from time to time and depended on the distribution of troops. From the beginning of 1917 the Command was divided into two districts—Eastern and Western—to each of which a specialist sanitary officer was appointed, the sanitary appointments at Command headquarters being abolished. The system of medical areas was, however, continued in both these districts. The Local Government Board of Scotland kept in close touch with the specialist sanitary officer of the Command through one of its medical inspectors; the senior medical officers of areas maintained close touch with the local medical officers of health; and civilian sanitary inspectors both in town and country exercised systematic supervision over billets, public

halls, schools and other buildings occupied by troops. Further, in many cases a civil medical officer of health was appointed as civil medical practitioner in charge of troops.

The Irish Command had a sanitary organization somewhat similar to that in Scotland, the specialist sanitary officer in the Command and local officers in charge of camps, garrisons and units keeping in touch with the Public Health Department of the Local Government Board and medical officers of health. A specialist sanitary officer was appointed to each of the A.D.M.S. districts of the Command, but the tenure of his appointment was insecure and the post was often vacant.

As regards subordinate personnel for sanitary work in the home commands, the regimental sanitary detachments were far from efficient, both in training and in numbers, in many of the new units and territorial force units on mobilization, owing partly to frequent changes of personnel and partly to the want of experience or indifference of their commanding officers as regards sanitary details. It was seldom that the normal sanitary detachment of one N.C.O. and eight men was allowed in a battalion. This was especially so in the case of units of the Royal Air Force. Consequently, those individual officers and men of the 1st and 2nd London Sanitary Companies, who were posted to commands, were distributed to various sanitary districts and regimental units for duties of a supervisory character. At first the men worked under their own officers, but as their duties necessitated their being attached for rations and discipline to units in various localities, the control of their own officers was more nominal than real and their immediate commanding officer became the medical officer of the unit to which they were attached. Later on, both officers and men were posted for duty under the specialist sanitary officer of the area and took charge of all schemes of sanitation within the command, especially those schemes which dealt with incineration of refuse and excreta. Their duties were, however, always of a supervisory character, the actual work being carried out by contractors' personnel or personnel of labour companies.

The establishment of London Sanitary Companies in each command varied. In the Southern and Northern Commands for example, an establishment of 100 was authorized, consisting of eight warrant or non-commissioned officers and 92 privates. The number of officers was not fixed and varied within wide limits. Amongst those who enlisted in the companies before the Military Service Act was passed were many men with professional knowledge as engineers, architects and chemists, or were men who in civil life were

the managers of extensive commercial enterprises and of recognized administrative ability. Others were skilled tradesmen, mechanics, plumbers, and bricklayers. After the Act was passed only men of low physical category were appointed to the London Sanitary Companies for home service. In the earlier stages of the war, when the actual number of men in the companies was small, the majority had been drafted overseas to form the new sanitary sections with divisions. The London Sanitary Companies not only carried out all the duties allotted to them, but initiated practical reforms in sanitary matters. Technical difficulties were overcome, sanitary apparatus and appliances were evolved from scrap heaps, labour gangs were organized, plans were drawn, and schemes materialized often from a mere suggestion made to them; so much so that from the earliest days the London Sanitary Companies may fairly claim to have played one of the most important parts in connection with sanitation during the war both in the United Kingdom and overseas.

The work carried out by the sanitary organization at home was of a very varied character and embraced most of the sanitary requirements of a civil population. Amongst the earliest problems which had to be faced was that of the detection and isolation of infectious diseases. The fear of outbreaks of enteric fever during the autumn of 1914, when troops were being crowded into camps before camps were ready in a sanitary sense to receive them, was fortunately not realized; but when troops were moved into billets from the tented camps for the winter, another disease, cerebro-spinal meningitis, became epidemic and continued during the war with greater or less prevalence, especially amongst the Canadian and other Dominion contingents. It was prevalent amongst the civil population as well as amongst the troops, and showed a marked recrudescence in 1917. In fact, the only important epidemic diseases in the home commands, which called for special measures, were the outbreak of cerebro-spinal meningitis in the winter of 1914-15 and subsequent years, and a widespread and fatal outbreak of influenza in the winter of 1918-19. Bacteriological centres, under bacteriological specialists, were established in all commands; inhaling chambers were constructed in camps for nasopharyngeal disinfection of whole battalions; and sample swabbings for detection of carriers and of contacts became a routine practice, carriers being isolated until the swabbings were negative.*

* The exact definition of a "contact" was not formulated. It generally referred to any one sleeping in the same room, hut, or tent with a man who developed infectious disease, but was variously interpreted according to circumstances.

Free ventilation, increase of lateral sleeping space for each man in barracks and huts, and prevention of overcrowding generally were measures specially required in connection both with the cerebro-spinal fever and with the influenza epidemics. The huts constructed for the Royal Air Force in some localities at any rate, notably in the Southern command, were not well adapted for free ventilation. They were of a type different from those adopted for other troops, and were not so well constructed from a sanitary point of view. The military sanitary officers were made responsible for the sanitation of aerodromes, and considerable trouble was caused by the difficulties encountered by them in maintaining a satisfactory standard of sanitation in them, especially in combating the epidemic of influenza. In fact, the system of dual control under which disciplinary measures connected with sanitation had to be adopted by commanding officers of Royal Air Force units while the responsibility for the sanitation of their camps rested with the Army Medical Administration did not prove satisfactory.

Scabies and verminous conditions called for routine disinfection of clothing and blankets. The rapidity of mobilization and the introduction into camps of large numbers of recruits might well have created a somewhat extensive incidence of these conditions at the beginning of the war, but the prevalence of vermin was never high at any time or place at home. The men were frequently inspected by medical officers and suspected cases were at once removed for treatment. In some commands, notably in the Eastern Command, special scabies treatment centres were established. By the summer of 1918, 28 had been opened in that Command. They were organized not only for treatment, but also for disinfestation and issue of clean clothing. Excessive sulphur treatment with resulting dermatitis was the chief difficulty in dealing with scabies, so much so that an Army Council Instruction on the subject was issued early in 1918 standardizing the treatment and insisting on definite preventive measures and skin inspections being carried out.

The means of disinfection were various. At large stations permanent steam pressure disinfectors were established, at others portable Thresh disinfectors and Clayton apparatus for disinfection by sulphur dioxide gas were used for the routine disinfection of clothing and blankets.

But the diseases which probably caused the greatest amount of constant inefficiency in the home commands and which called for special preventive measures were venereal diseases. The incidence of these was very high amongst troops

of the Dominion contingents, in somewhat marked contrast with their incidence amongst other troops. In the Southern Command, for example, where the greater number of the Australian and New Zealand troops were stationed, the annual admission-rate was estimated to be as high as 128 and 130 per 1,000 of strength respectively as compared with 24 per 1,000 amongst other British troops in the Command. The inefficiency may be estimated from the average stay of each case in hospital, which was from five to seven weeks. Efforts were consequently made to prevent venereal disease by the establishment throughout the home commands of self-disinfection centres, called "early treatment centres," where men were provided with the means of disinfection after exposure to risk. Medical officers were appointed in the later stages of the war as inspectors of these early treatment centres. The duties were not only to see that the centres were properly maintained and used but also to educate the men by lectures on the danger of venereal diseases and by demonstrations on the methods of personal disinfection. The success of these centres in preventing venereal disease is a matter of controversy. At first they were placed in latrines, where the lighting was bad and without an orderly in attendance; nor was it possible, by recording the names of those who made use of them to trace the after-results. But the difference in the incidence of venereal diseases amongst the Australian and New Zealand troops and other British troops in the United Kingdom is remarkable from the fact that preventive measures were enforced amongst the Dominion troops and not amongst the British. In the American camps, too, personal disinfection after exposure was also rigidly enforced, and in the early treatment centres of the Australian, New Zealand, and American units an orderly was always in attendance. Yet they suffered from venereal disease in far greater proportion than the British troops. It is little wonder, therefore, that sanitary organization for the prevention of these diseases has become highly controversial, for the value of immediate disinfection for the prevention of infectious diseases of this nature can scarcely be disputed as an abstract principle, however it may have failed in practice.

The prevention of disease by vaccination and prophylactic inoculations was very thoroughly carried out in the home commands. Vaccination against small-pox was enforced in accordance with the conditions under which recruits attested; but in January, 1916, the Army Council decided that men who declined vaccination might be enlisted, and in September of the same year permitted unvaccinated men to proceed as drafts to expeditionary forces. This relaxation in the regulations

governing vaccination had a disastrous effect amongst troops in Mesopotamia. Small-pox was endemic amongst the Arabs, resulting in a serious and fatal outbreak of small-pox amongst those British troops in contact with them who had not been vaccinated. Inoculation against enteric fever was not compulsory, but education of the troops with regard to it had excellent results; results, which may justly be described as unparalleled in war. During the influenza epidemic and during a sharp and serious outbreak of purulent bronchitis, probably of influenzal origin, amongst New Zealand troops in February, 1918, vaccines were used as prophylactics. The vaccine used by the New Zealand troops was an autogenous, mixed catarrhal vaccine, but during the influenza epidemic the War Office issued a supply of somewhat differently constituted mixed vaccine, prepared at the Royal Army Medical College. These vaccines were not, however, universally used in the United Kingdom.

When convalescents from malaria began to arrive in England from Macedonia and elsewhere in large numbers, there was some anxiety regarding infection of the civil community in localities where mosquitoes were likely to breed. A reconnaissance of mosquito infested areas in all commands in the United Kingdom was consequently made, with a view to the suppression of mosquito breeding and preventing the concentration of malarial patients in areas where mosquitoes existed. In connection with these measures an entomological laboratory was established at Sandwich early in 1919.

Amongst other sanitary work of the specialist sanitary officers, the arrangements for warming and ventilating huts, for ablution, for drying wet clothes, for supervision of canteens, kitchens, and messing generally, for disposal of waste products, methods of incinerating refuse and night-soil, the prevention of flies, and the destruction of rats, came under their routine administration and supervision.

The establishment of destructors or incinerators, and the organization and supervision required to make the disposal of latrine contents by these methods effective, were the special concern of officers and men of the London Sanitary Companies. In January, 1916, the Army Council decided that incineration of night-soil should be the rule in hutment camps where water-borne systems of sewage were not in existence. Sanitary establishments were to be formed for the purpose in each camp and placed under the control of the sanitary officers, who were made responsible for the intelligent working of the system and had authority to deal direct with command headquarters. At first commercially manufactured destructors,

such as the Horsfall and Meldrum patterns, were provided, and an establishment of two men for loading and firing and for cleaning receptacles, with additional labour for removing receptacles from latrines, under a non-commissioned officer, was authorized for each destructor for a unit of 1,000 men, but for the larger destructors for camps of several units the number of destructor squads was increased in proportion. The men employed were specially trained for the purpose and were to be men fit for home service only.* After September, 1916, inexpensive improvised types of incinerators such as were being used in the field, and of the type known as the "Bailleul" incinerator made from empty biscuit tins and clay, were ordered by an Army Council Instruction to be constructed in future in preference to the more permanent and expensive Horsfall or similar destructors.

Progress, however, in organizing incineration and providing destructors was as a rule slow, and there was occasionally some local opposition to the system, but sufficient experience had been gained during 1916 to enable the sanitary authorities to estimate more precisely the establishment, equipment and transport required for different classes of destructors. The details of these were issued in an Army Council Instruction of January, 1917. Unit destructors of all types for 1,000 men were allotted a squad of four men each, while larger destructors for 4,000 to 6,000 men, or 6,000 to 8,000 men were allotted one non-commissioned officer and fourteen or sixteen men. The specialist sanitary officer at command headquarters was then made responsible for the erection of "Bailleul" destructors, and for the organization of all schemes of incineration in the command.† Local opposition to incineration schemes was thus avoided.

Some figures and experiences of incineration, obtained from the Southern Command, are of value. At the time of the Armistice the night soil of 144,264 men was being incinerated in this Command, amounting to a daily average of 51 tons with an average daily consumption of 8 tons of fuel.‡ The personnel employed was 576 labour men and members of the London Sanitary Companies. On demobilization of the Labour Corps and the consequent impossibility of obtaining military labour, the incineration of night-soil was carried out by contract, but this proved so unsatisfactory that the specialist sanitary officer was authorized to engage civilian labour for

* Category Cii, A.C.I. of the 24th June, 1916.

† In the Eastern Command some 400 incinerators were erected, of which 200 were of the "Bailleul" type, 125 were Horsfalls, and 75 were other types.

‡ The fuel authorized by A.C.I. of January, 1917, would amount to 11 tons.

the purpose, and thus continued, under his direct supervision, the system of incineration which was carried out before demobilization. This arrangement, both from an economic and sanitary point of view, proved much superior to the contract system. Various other methods were employed for disposal of night-soil, but they were more or less of an experimental character and had no special bearing on sanitary organization in commands at home; but in the early days of the war the removal and disposal of night-soil were carried out by contractors. Both economically and sanitarily the contract system failed, and it was in fact due to this, as well as to the success of incineration in the armies in the field, that disposal by incineration was introduced into the home commands at the beginning of 1916.*

Sanitary salvage was also a special feature of the sanitary services during the war in the home commands; and the collection and disposal of fats, paper, tins, or other waste material of commercial value became part of an organized system, which resulted not only in profit but in cleaner camps.

Reference has been made to the co-operation of the Local Government Board in supervising the preparation of supplies of food for the army. Under the direction of its Chief Inspector of Foods, civilian medical officers of health kept the preparation of army foods under close observation locally with a view to ensuring only wholesome materials being used and prepared under good hygienic conditions. The assistance which local public health authorities generally, under the guidance of the Local Government Board, had rendered since the outbreak of the war was acknowledged by the Army Council in a letter to the Secretary of the Local Government Board of the 25th March, 1915, referring in special terms to the valuable services which had been given by medical officers of health, sanitary inspectors, and other officials of the local authorities in co-operating with the military sanitary services.

Finally, under sanitary organization in the home commands, the importance of special schools of instruction for training R.A.M.C. personnel for sanitary duties, assumed considerable prominence in the later stages of the war. It will be remembered that the army school of sanitation at Aldershot was closed on mobilization. It was reopened, but for laboratory work only, in January, 1915, although from time to time afterwards courses in sanitation were held for officers

* In the Southern Command contractors at first demanded 6*d.* per bucket, but when they came into competition with the incineration system, contracts were tendered at less than 1*d.* per bucket.

and men ; but no definite organization of schools of sanitation was authorized for commands generally until much later. The officers and men of the London Sanitary Companies of the Territorial Force R.A.M.C. were trained at their depôt at the Duke of York's School in London until their removal to Blackpool, and the D.D.sM.S. of some of the commands, on their own initiative, commenced a series of lectures on practical sanitation and hygiene, mainly for combatant officers. In the Eastern Command, for example, courses of lectures were given from August, 1917, in the Royal Sanitary Institute buildings, with demonstrations at the London Sanitary Companies' depôt. Each course lasted three days and consisted of six lectures on hygiene, water supply, food, insect-borne diseases, and tropical hygiene, with two practical demonstrations. They were given by the Command sanitary officer and distinguished scientists who offered their services. Fifteen courses of lectures of this nature, attended by 955 officers, were given up to the 8th November, 1918. In the Scottish Command three-day courses of instruction in military hygiene were also given. They were held at Glasgow University, and twenty medical officers and one hundred combatant officers, including officers in charge of messing, attended each course. The lectures comprised the principles of prevention of disease in war, dietetics, entomology, camp sanitation, and tropical sanitation, with demonstrations. The lecturers were the professors of Public Health, Physiology, and Zoology of the University, the Command specialist sanitary officer, and the consultant in malaria. Similar courses were arranged by the Command sanitary officer in the Southern Command. But the first definitely authorized school of army sanitation during the war, as distinct from the pre-war school at Aldershot, was at Leeds in the Northern Command. It was established in the grounds of the 2nd Northern General Hospital, originally with a view to instructing in field sanitation those officers of the U.S. Army who were undertaking service with the British. Captain Daukes, of the sanitary service of the Territorial Force R.A.M.C., who had much experience in France in command of a sanitary section, was responsible for its organization. Large numbers of British and American officers attended the courses of instruction in it. But when Blackpool became the training centre for the R.A.M.C. much useful training in sanitation was carried out as part of the ordinary R.A.M.C. training course there, and subsequently a School of Hygiene was established which took the place of the training school of the London Sanitary Companies when the latter were transferred to Blackpool in 1918, as well as providing advanced instruction for officers and sanitary specialists, especially in

tropical medicine and hygiene. Schemes for the establishment of schools for sanitary instruction in each command, following the general organization adopted in the establishment of the Leeds school, were under consideration at the time of the Armistice, but as the instructions for these were not issued before the war had come to an end, they played no part in the sanitary organization of the war. Like the general organization of sanitary services under a Director of Hygiene at the War Office, they were an after-product.

CHAPTER XI

ORGANIZATION OF VOLUNTARY AID

VOLUNTARY aid, since the campaign in Italy of 1858, has played a prominent part in time of war in connection with the care and comfort of the sick and wounded. It has been a popular tradition that the regular medical services of an army, either from inadequacy of personnel and equipment, or from lack of elasticity and sympathy in administration, are incapable of giving all the care to which sick and wounded are entitled. But whatever may have been the original causes of this popular tradition it is essential to recognize that it is through voluntary aid organizations more than through official channels that the sympathy of the people, of the women of the country, and of those who from various causes are unable to take a more active part in a nation's struggle finds expression. It thus becomes that element in the medical services of an army during war which appeals most to the popular imagination and obtains the greatest support in the public press.

But without organization and responsible control and guidance in time of war voluntary aid is apt to be wasteful, to embarrass military administration, and thus to become a forcible example of misdirected effort. Further, it is liable to be used by some as a means of gaining notoriety or social advantage, and it not infrequently happens that individuals engaged in espionage endeavour to obtain admission into the ranks of voluntary organizations because of the opportunities afforded for ascertaining facts regarding movements of troops and casualties, and because of the freedom they experience from control in the belief that they are engaged in humanitarian work. This at any rate has been the recorded experience of previous Continental wars.

It is, however, a difficult and delicate matter to control officially those organizations, local committees and private individuals who are genuinely eager to help whenever war is declared. The Field Service Regulations had thrown the task of doing so on the British Red Cross Society. Its duties, in accordance with the regulations, were to consider all offers of assistance in aid of the sick and wounded and communicate them to the Army Council if they were likely to be of practical value.

The offers of assistance were regarded as falling under two classes: first, offers of assistance from those willing to provide suitable gifts and receive convalescents; and secondly, those willing to provide complete medical units. The British Red Cross Society, according to the regulations, was to organize a central depôt for the collection of gifts from voluntary sources, and the name and address of the central depôt was to be published in the public press on the outbreak of war. As regards voluntary medical units, they were obliged by the Geneva Convention to conform with the constitution, personnel, and equipment of corresponding medical units in the army; and, if accepted by the Army Council, were to come under the orders of the military authorities and be incorporated with the medical units in the army in whatever manner and for whatever purposes the Commander-in-Chief might determine. Their employment, however, with field units or formations was not permitted except under special authority, and no one who was not a British subject was permitted to be employed in them. In all cases the Army Council reserved its right to accept or reject any or all offers of voluntary aid in time of war; and such as might be accepted were subject to the authority of the Commander-in-Chief, from whatever source they might come.

These regulations failed in their intention in the early stages of the war, chiefly because the constitution of the British Red Cross Society in peace did not provide for guidance by and association with the responsible military and army medical authorities, or for co-operation with other voluntary aid organizations; and it had no suitable premises available at once for the organization of a central depôt for the collection and distribution of gifts and comforts to the sick and wounded.

The situation may be explained best by a brief retrospect of the origin of Voluntary Red Cross Organizations in Great Britain.

A National Society for Aid to Sick and Wounded in War had been formed, mainly through the influence of certain members of the Order of St. John of Jerusalem, at the time of the Franco-German War of 1870-71; but it only existed in after years as the trustee of the surplus funds which had then been collected and which were utilized, along with other contributions, in affording a measure of voluntary aid to the sick and wounded in various subsequent wars. Although it was, therefore, not organized in any way as an auxiliary on which the Army Medical Service could depend, it represented an element out of which a National Red Cross Society might be formed under suitable organization and association with

military administration. The need of suitable organization of this kind was brought forcibly to the notice of the War Office by its delegate to the 6th International Conference of Red Cross Societies in Vienna in 1897.* In reporting on the importance and excellence of the voluntary aid organizations of other countries, he pointed out how the want of similar organization in Great Britain would lead to serious embarrassment and confusion should Great Britain be involved at any time in a great war.

Lord Lansdowne was then Secretary of State for War, and, at his direction a conference was held at the War Office on 8th July, 1898, with the representatives of voluntary aid organizations for the purpose of considering the organization of voluntary aid in time of peace on the lines of the Red Cross Societies of other countries. The conference agreed to the formation of a permanent Central British Red Cross Committee which was approved by the Secretary of State for War in January, 1899, and the fact was made known through the public press in the following April. The Committee, as officially recognized, consisted of representatives of the St. John Ambulance Association, the National Society for Aid to Sick and Wounded in War, the St. Andrew's Ambulance Association, Princess Christian's Army Nursing Service Reserve, and the Directorates of Mobilization and Medical Services at the War Office. Voluntary aid organization had thus come into being a few months before the outbreak of the South African War. The outbreak of that war, however, prevented progress being made in the development of the schemes which the committee was maturing for the peace organization of voluntary aid; but the value of the association of the voluntary societies with the War Office authorities was so obvious that steps were taken after the war to strengthen the constitution of the Central British Red Cross Committee and to extend its work so as to bring the general principles and requirements of Red Cross organization more in touch with the country at large and with the British Dominions and Colonies. For this purpose a carefully organized scheme was drawn up by a sub-committee of the Central British Red Cross Committee† in 1904. The Committee was renamed the Central British Red Cross Council. Its functions included the general control and organization of voluntary aid, and it was to be the medium of official communication between the War Office and voluntary aid societies, and with Red Cross

* Surgeon-Major W. G. Macpherson.

† The late Sir John Furley, Sir A. Keogh (then D.D.G., A.M.S.), the late Major T. McCulloch (D.A.D.G., A.M.S.), Hon. Secretary of the Committee.

organizations abroad. Its constitution was similar to that of the original Central Committee. The National Society for Aid to Sick and Wounded in War was to be represented by three members, the St. John Ambulance Association, the Army Nursing Reserve, the St. Andrew's Ambulance Association, and the Admiralty by two members each; and the Secretary of State for War by the Deputy Director-General of the Army Medical Service, the Officer in charge of Mobilization Services, and the Officer in charge of Medical Mobilization Services. The National Society for Aid to Sick and Wounded in War was to retain its designation, but its constitution was to be revised, and its committee strengthened to enable it more fully to carry out the functions of representing the popular side of voluntary aid, of organizing local committees of voluntary aid as branches of the society in districts and towns, and of collecting and holding funds.

This scheme was officially adopted and published in 1904, and if the Central British Red Cross Council had continued its existence from then onwards there would have been ready when war was declared an organized authority, representing all the elements of voluntary aid, with power to co-operate with, guide, and, where necessary, restrain voluntary efforts at the time when popular guidance and restraint were needed most.

Unfortunately the Central British Red Cross Council, although officially recognized, was immediately dissolved before it had commenced exercising its functions. Those who had at the time the direction of the National Society for Aid to Sick and Wounded in War, and who held the funds without which a central organization of voluntary aid in time of peace would not be possible, deemed it wiser to form the Society into a British Red Cross Society, which should be entirely independent of the War Office and have no association on a central council with official representatives of responsible military authorities or other voluntary organizations.

As was proved by subsequent events, a cardinal error had been made, and could only have been made by a misunderstanding of the restrictions under which the emblem and distinctive sign of the Red Cross could be used by any voluntary society. Both designation and emblem are the distinctive sign of the medical services of armies, and no person or society is at liberty to use them under the articles of the Geneva Convention, either in time of peace or in war, unless employed in medical units and establishments of armies and subject to military law and regulations. In other words, the army medical services, strictly speaking, are the Red Cross, and the emblems seen

on ambulance wagons, motor ambulance cars, ambulance trains, hospital ships, and other material, indicate that they are the property of the State and the transport and equipment of its military medical services.*

It is necessary to make the significance of this clear, as both in the public press and in other writings during and after the war the erroneous impression has been created that where mention was made of the work of the Red Cross in the field it referred to the work of the Red Cross societies and not of the military medical services, and when ambulance trains, ambulance cars and other material were seen marked with a Red Cross on a white ground, that they were contributions from voluntary organizations under the Red Cross Society, whereas in the majority of cases they were the ordinary equipment of army medical units. The importance, therefore, of close association at all times in peace and war between the army medical authorities and societies who had been permitted to use the term " Red Cross " underlay the whole spirit and intention of the Geneva Convention as revised in 1906,† and was a prominent feature in the organization of voluntary aid in other belligerent countries which took part in the war that broke out in 1914.

It was, however, under different conditions that the British Red Cross Society came into existence and commenced taking a more active part in peace organization of voluntary aid to sick and wounded than the National Aid Society had previously regarded as its function. Its attitude of independence from War Office guidance or control and its severance from association on a central council with other important voluntary organizations created a situation which could only be regarded with misgiving.‡

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* Article 10, Geneva Convention of 6th July, 1906: " The personnel of voluntary aid societies, duly recognized and authorized by their Government, who may be employed in the medical units and establishments of armies, is placed on the same footing as the personnel referred to in the preceding Article, provided always that the first-mentioned personnel shall be subject to military law and regulations."

Article 18, " The heraldic emblem of the red cross on a white ground . . . is retained as the emblem and distinctive sign of the medical service of armies."

Article 23, " The emblem of the red cross on a white ground and the words ' Red Cross ' or ' Geneva Cross ' shall not be used either in time of peace or in time of war, except to protect or to indicate the medical units and establishments and the personnel and material protected by the Convention."

† In the original Convention of 1864, voluntary organizations had no privileges in war nor were they recognized as having any claim to the designation or emblem of the Red Cross.

‡ These remarks do not, of course, apply to the organization of voluntary aid detachments which were initiated by the War Office to form an integral part of the Territorial Force, and which were controlled and co-ordinated by the Territorial Force County Associations.

At first the lack of co-ordinated effort on the part of voluntary organizations led to confusion and embarrassment, and much of the time of the administrative medical services and other responsible authorities at the War Office was occupied at the most critical period of the war in endeavouring to satisfy the conflicting interests of the various voluntary bodies, which the state of war had roused into activity. On one side the British Red Cross Society found it difficult to carry out its duties under the Field Service Regulations without War Office guidance; and on the other hand the War Office, without association with voluntary organizations, had not full or adequate knowledge of what they were organizing or capable of carrying out.

In order, therefore, to establish some form of co-ordination and guide the voluntary organizations into channels where their activities might be most useful, the Army Council, shortly after war was declared, invited representatives of the British Red Cross Society, the Order of St. John of Jerusalem, the St. Andrew's Ambulance Association, the Soldiers' and Sailors' Help Society, and the Admiralty, to meet at the War Office weekly under the chairmanship of the Deputy-Director General of Medical Services, and discuss the general situation. The first meeting was held on the 29th August, 1914,* when Mr. Makins and Sir Rowland Bailey, representing the British Red Cross Society, gave an account of the work of the Society up to date. A medical unit under Dr. James Wyatt had been sent to Brussels during the previous week; and a small rest station party was being sent to Boulogne that day. A party of ten surgeons, ten dressers, and twenty nurses was being organized to proceed to France to work under the Chief Commissioner of the Red Cross Society there†; and arrangements were being made to open a store at Rouen or Havre for supplying comforts and distributing gifts to sick and wounded. The Society was classifying voluntary hospitals in England, and had offered a fully equipped hospital of 500 beds to be established as a section of the Royal Victoria Hospital, Netley. It was also receiving offers of motor cars for ambulance purposes. Both the Order of St. John and the St. Andrew's Ambulance Association were organizing depôts for reception and distribution of gifts, in addition to providing the personnel for the Home

* This committee continued to meet weekly until August, 1915, when meetings were held monthly until the end of the year. They were then discontinued. In a letter expressing regret at the committee ceasing to exist, the representative of the St. Andrew's Ambulance Association stated that he had found the committee of much value to his association, as it gave them an opportunity of ventilating a good many matters.

† Sir Alfred Keogh, who had gone to Brussels on the 18th August and from there to Paris.

Hospital Reserve. The Soldiers' and Sailors' Help Society was organizing convalescent homes, as already described.*

While this attempt at bringing voluntary organizations together was being made by the Army Council, the Chairman of the British Red Cross Society, Lord Rothschild, on behalf of his Executive Committee, made a strong and urgent appeal to the War Office on the 19th August, 1914, asking Lord Kitchener to appoint a highly placed representative of the War Office to the Standing Committee of the Society in order that the responsible Government department might be in touch with the difficulties experienced by the Society owing to its not having the power to control the irresponsible offers of assistance, appeals for money, and use of the Red Cross name and emblems. Lord Rothschild in his letter stated that unless some definite and strong steps were taken by those having authority to take them, a waste and misapplication of money and effort could not fail to result. In other words, without association with the responsible military authorities the British Red Cross Society felt itself unable to carry on its functions under the Field Service Regulations. In view of the demands on the time and energies of all at the War Office at the moment and of the arrangement by which a representative of the Society was in regular attendance at the War Office, it was impracticable to comply with Lord Rothschild's request by appointing an officer of the Director-General's staff to this Standing Committee, but on the 3rd September, 1914, the Army Council invited Sir Launcelotte Gubbins, who had recently retired from the post of Director-General, to represent the War Office on it.

Neither these measures nor the War Office Committee mentioned above were able at first to bring about full co-ordination of voluntary effort, or to prevent abuse of the Red Cross emblem. The British Red Cross Society and the Order of St. John continued to work independently of one another. On the 24th August, 1914, the Secretary-General of the Order of St. John, Sir Herbert Perrott, wrote to Lord Kitchener pointing out that endless confusion, delay, and loss of valuable services and of considerable financial assistance would be entailed by adherence to the regulations that offers of hospitals made to or by the ambulance department of the Order had first to be approved by the British Red Cross Society. He asked that the Order of St. John should be placed on the same footing as the Society in all matters connected with voluntary aid in war.

It was thus evident that the only way in which the claims

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* Chapter V, p. 88.

of these two influential voluntary aid organizations could be adjusted was by the formation of a Joint War Committee of representatives of both, and in order to emphasize this principle the Army Council sent an official notification to the British Red Cross Society, the St. John Ambulance Association, and the St. Andrew's Ambulance Association, informing them that they all formed part of the Red Cross organization of Great Britain and were recognized by the British Government as societies authorized to assist the medical services in time of war, under Article 10 of the Geneva Convention.

Both the British Red Cross Society and the Order of St. John then issued circular letters to their members, that of the British Red Cross Society being in the following terms:—

> "The British Red Cross Society, the St. John Ambulance Association, and the St. Andrew's Ambulance Association are officially notified by the War Office that they form part of the Red Cross organization of Great Britain, and they are recognized by the British Government under Article 10 of the Geneva Convention as societies to assist the medical services in time of war. There has, unfortunately, been some friction in some parts of the country between the St. John Ambulance Association and the British Red Cross Society in its local administration. It is felt by both Societies that in present circumstances all these past differences should be forgotten and laid aside, so that they should work in complete harmony together, and the fullest use be made of both organizations in the interests of the sick and wounded. It is desired that the County Directors and other officials should co-operate in every possible way to assist the work of both organizations equally."

The circular memorandum of the Order of St. John was in similar terms, and also referred to the regrettable friction which existed in various parts of the country between the St. John Ambulance Association and the British Red Cross Society in local administration.

A letter from the War Office, dated the 6th September, and addressed to the President of the British Red Cross Society, was printed with the circular saying that the Army Council was watching with close interest the activities of the British Red Cross Society, and were especially glad to learn that they were working in close association with other bodies recognized by Government as forming part of the Red Cross organization of Great Britain. The Council were confident that the public would continue to help both the British Red Cross Society and the St. John Ambulance Department, and in doing so would

recognize also the share of the work on behalf of the sick and wounded which was being done by the Soldiers and Sailors Help Society, and the St. Andrew's Ambulance Association.

The formation of the Joint War Committee of the British Red Cross Society and the Order of St. John, which became so well known afterwards during the war in establishing depôts for distribution of gifts and comforts to the sick and wounded, and in organizing voluntary offers of ambulance cars and ambulance trains, followed, and came into effect on the 20th October, 1914, with the Hon. Arthur Stanley as chairman, and Sir Herbert Perrott, the Secretary-General of the Order of St. John, as vice-chairman. Although in a somewhat imperfect and modified degree, it was in practice a return to the original War Office conception of a Central British Red Cross Council.

Amongst the questions which had to be decided were questions regarding the sale and use of the Red Cross brassard, the nature of the uniform to be worn by personnel of the Red Cross Society, the flying of the Red Cross flag over buildings, and the marking of private vehicles and material with the Red Cross. These were matters regarding which voluntary aid organizations and the public generally were not well informed.

The Red Cross brassard appears to have been regarded as a distinctive mark of the voluntary worker at home or overseas; whereas it was in reality part of the official equipment for the protection under the Geneva Convention of personnel of army medical units and establishments which might fall into the hands of the enemy during battle. That the personnel of British voluntary aid organizations would find themselves in that position was a remote possibility unless hostilities were carried on in the United Kingdom. Any other brassard than that stamped and delivered by competent military authority would, however, have no value as a protection, and might indeed prove harmful to the wearer.* Yet on this point the Articles of the Geneva Convention were either unknown, or misunderstood and misinterpreted, if not actually ignored; and many voluntary workers appeared in Belgium and France, as well as

* An instance of this actually occurred. The British Red Cross Society had sent to Belgium a unit of 10 surgeons, 10 dressers and 20 nurses, on the 16th August, 1914, and as they found no work to do in Brussels, two of the surgeons—Dr. Elliott and Mr. Austin—were sent by the Belgian Red Cross Society to the district South-east of Namur, where they found themselves in the midst of German troops. They were suspected of espionage, and it was some time before they were recognized as members of a Red Cross Society. Dr. Elliott stated that this was in spite of the fact that they were wearing the official brassard, but there is no record of an official brassard having been given and stamped by competent military authority in this country. Subsequently, when a similar party was being sent to France at the end of August, to open a hospital under the Director of Medical Services, official brassards were applied for and issued by the War Office.

in the United Kingdom, with Red Cross brassards, for the wearing of which they had no military authority. In order to prevent this misuse of the Red Cross emblem, the War Office issued a warning to the public at the end of September, 1914, by means of a press communiqué, drawing attention to the Geneva Convention Act of 1911, under which any person acting in contravention of its provisions was guilty of an offence against the Act and liable to a fine of £10 and other penalties on summary conviction. Various complaints had been made of Red Cross brassards, and articles of clothing marked with a Red Cross, being exhibited in shop windows and ticketed for sale with such expressions as " very smart for present wear."*

The only brassard which could be issued to voluntary organizations had to be restricted to personnel who were accepted for duty under military law and regulations in medical units of the army; but applications at the beginning of the war were constantly being made for official brassards to enable personnel of voluntary units to proceed to France and Belgium, without any indication being given of the nature of the work they proposed carrying out or where they were going. It was necessary, therefore, to determine these points and ascertain whether such personnel could be incorporated in the medical establishments of the British Expeditionary Force before they were permitted to go overseas. An agreement had been made by the Chief Commissioner of the British Red Cross Society and the French authorities by which British Red Cross Society's personnel in France when assisting the French Army Medical Service would work under the French Military Command and Army Medical Service, so that it was also necessary to determine whether the personnel being sent to France were intended for assisting the French medical service, as under that agreement they were to be provided with official brassards by the French military authorities. The question of issue of official brassards was still further complicated by an application for the issue officially of brassards to personnel of an ambulance unit, which the British Red Cross Society proposed to send from England to Belgium to search for British sick and wounded in territory occupied by the enemy after the British retreat from Mons. As such a unit could not in any way come under the military command of the British Expeditionary Force, it would obviously be a

* The attention of the War Office was drawn to this by members of voluntary aid detachments, county directors, chief constables, and others. After the appearance of the warning, the trade as a whole acted with the greatest desire to assist the authorities in avoiding any contravention of the Act.

contravention of the Geneva Convention to provide its personnel with official brassards, and the mere fact of such brassards being delivered would endanger the protection which the Red Cross brassards were intended to give to the personnel of the medical units of the Army; for the German military authorities would not be slow to discover any irregularity in their issue, and to regard such as an excuse for refusing further protection to army medical personnel, who might fall into their hands.

The duty of the responsible military authorities was clear. They could not over-ride the restrictions imposed by a Convention, which Great Britain along with the other belligerents had ratified; and it was impossible for them to give official recognition to any contravention of it which voluntary aid organizations might attempt.

But the demands for official brassards by personnel, whom the British Red Cross Society was sending to France, became more and more insistent, without their being able to explain the nature of their duties in France, or whether they were going to work in French or British medical units. Arrangements were consequently made by the War Office to send the necessary brassards to the Director of Medical Services of the British Expeditionary Force. He would thus be in a position to issue them to those individuals who came under the control of the British military authorities, and the War Office would be spared the embarrassment of refusing brassards to personnel of whose ultimate sphere of activity it was ignorant.

All these complicated questions of official brassards* were the main cause of the change of policy referred to in the account of the administration of the medical services, by which the responsible control of the voluntary Red Cross organizations in France was vested in the Director-General of the Medical

* The issue of brassards to voluntary aid detachments had been provided for through commands and County Territorial Force Associations immediately after war was declared; with regulations as to their issue, record of issue, certificates of identity, numbering and stamping. It was the issue to irresponsible personnel that created complications. On the 17th October, 1914, Colonel J. Magill, the Organizing Secretary of the British Red Cross Society and a retired officer of the Coldstream Guards and Army Medical Service, was appointed by the War Office as the competent military authority for signing identity certificates for the members of the B.R.C.S. who were authorized to proceed overseas, and in March, 1915, a special brassard for them was issued. It was similar to the army brassard but had a red border, and in addition to bearing the army medical stamp, it was also stamped by the B.R.C.S. with the date of its issue and its number. Voluntary aid personnel proceeding overseas to work with the British army were obliged in all cases to obtain this special brassard and the identity certificate. Brassards issued by county directors through Territorial Force Associations were not recognized as brassards for voluntary personnel proceeding overseas.

Services as Chief Commissioner of the Joint War Committee, and by which the Chief Commissioner of the British Red Cross Society, as an independent official, ceased to exist.

Another question connected with voluntary aid organization was that of the uniform of the personnel employed by the British Red Cross Society. The St. John Ambulance Association and Brigade had already a recognized uniform, but, with the exception of the voluntary aid detachments, there was no prescribed active service uniform for other personnel of the British Red Cross Society. The Society consequently submitted details of a uniform to the War Office, but, as it was more or less the same as the uniform of enlisted soldiers and commissioned officers, it was considered that a uniform of that description should only be worn by personnel of voluntary organizations employed under the Director of Medical Services of the Expeditionary Force. Eventually the difficulties of a distinctive uniform were overcome to some extent by granting honorary commissions in the army to the Commissioners, Assistant Commissioners and others employed in responsible duties connected with voluntary aid organizations.

With regard to the use of the Red Cross emblem and flag on material and buildings of Red Cross organizations, the Geneva Convention provided for such material being regarded as private property. It was arranged, therefore, that the name of the Red Cross organization should be placed on the Red Cross emblem to distinguish their property from property belonging to the State. With regard to buildings, there was much popular misconception. The War Office was receiving numerous applications from all parts of the country, more especially from the eastern counties, asking for military authority to fly the Red Cross flag over private houses, with a view in many cases to secure protection against hostile acts on the part of the enemy. It was not understood that the Red Cross flag on a building indicated that the building was the property of the State and could, therefore, become prize of war in the event of its being captured. It was not, however, considered advisable to issue a warning to the public on this point, in view of the possibility of its creating alarm. But on the 13th August, 1914, and again on the 9th January, 1915, the Army Council drew the attention of military commands to the indiscriminate and unauthorized flying of the Red Cross flag over private buildings, and directed them to take measures to see that this practice was discontinued. The only buildings which were authorized to fly the flag were those used exclusively for the reception of sick and wounded

soldiers, under the administration and control of the Army Medical Service.

Although these were the principal measures adopted for organizing voluntary aid after war was declared, so far as the care and comfort of sick and wounded were concerned, it was difficult to discriminate between the arrangements for collecting and distributing gifts and comforts to hospitals under the Red Cross organizations and the arrangements for sending gifts and comforts to troops in the field. Regimental associations had long been in existence in connection with the army, but otherwise there were no voluntary organizations for adding to the comfort of combatant troops. Consequently on the outbreak of war voluntary efforts were made for this purpose in various directions, not only in the form of Red Cross work parties, but also in groups of workers who worked more or less intermittently, and of others who were not affiliated to any central organization. The latter part of 1914 and the early part of 1915 also saw the formation of Queen Mary's Needlework Guild, Queen Alexandra's Field Force Fund, the National Fund for Welsh troops, besides many other societies in various local centres.

The object of these associations was to supply gifts in response to all applications which reached them personally, from officers and men, training camps, armies in the field, medical officers, matrons or nurses in military hospitals at home or overseas. There was no system in the mode of application or in the status of applicants, and although the demands were met as best they could by those who received them, there was no regular organization for dealing with the distribution of gifts The result was a great waste of time, labour and money; unsuitable patterns of articles were produced, and overlapping became a very serious matter. The Army Council consequently felt compelled to review the whole position of voluntary effort and evolve a general scheme of co-ordination in order that the great band of voluntary workers might have an opportunity of developing their work on lines which would secure not only economy and efficiency, but the maximum benefit to the troops individually and collectively, whether at home or overseas, in the field or in hospital. It was decided, therefore, to form a special department of the War Office for co-ordinating voluntary efforts on behalf of the troops, and a directorate of Voluntary Organizations, with Sir Edward Ward as Director-General in an honorary capacity, assisted by Mr. Allan Hutchings, was opened at the end of September, 1914, in offices in Scotland House, New Scotland Yard. The scheme prepared by Sir Edward Ward was framed on the

basis of establishing county, city, borough, and district associations with local committees, under which local voluntary organizations, depôts, and work parties would have an opportunity of amalgamating as one united whole, secure uniformity of work, and pool resources on well-organized lines and with a definite programme applicable to the whole country. The scheme was approved by the Army Council and explained to the public in a circular letter to the Press in October, 1915. It recognized Queen Mary's Needlework Guild as a separate organization, by which all the work parties of the Guild were formed into affiliated groups under the Central Depôt at St. James's Palace. It also recognized the Red Cross work parties as distinct bodies working under the Joint War Committee of the British Red Cross Society and Order of St. John, which then initiated a system of registering them under the Committee's head office in London. To prevent overlapping an understanding was arrived at in November, 1915, between Sir Edward Ward and Sir Arthur Stanley, the chairman of the Joint War Committee, by which the former would supply articles to military hospitals, and the latter to auxiliary and voluntary hospitals. This arrangement did not preclude the establishment of Red Cross stores in France and other theatres of war, for providing comforts and other articles to medical units in the field or on the lines of communication. All other workers, except those of the existing regimental associations, were assembled into groups under central offices of county, borough and district associations. In this manner some 2,983 groups of workers, with approximately 400,000 workers, were attached to 267 central associations, and, through the Director-General of Voluntary Organizations, were able to supply to military hospitals several thousands of articles such as pyjamas, bed-jackets, bed-socks, and operation stockings, some six million hospital bags, 12¼ million bandages and 45½ million dressings of all kinds.

The method by which the organization worked was to receive in the central office all requisitions from hospitals, but, in forwarding them to branch offices, to request the latter to forward the articles direct to the hospital concerned. This prevented local committees feeling that their contributions were being pooled in a large store and that they remained in ignorance of the final destination of their gifts.

One of the most useful of the activities of the organization has already been alluded to, namely, the supply of sphagnum moss as a surgical dressing. At the request of the Director-General of the Army Medical Service in 1917, Sir Edward Ward's department undertook to gather, collect, treat, supply,

and distribute sphagnum moss dressings to all army hospitals at home and overseas. In 1918, in view of the enormous demand for this article, a committee, known as the Sphagnum Moss Joint Committee, under the chairmanship of Sir John Duthie, and with the co-operation of Sir George Beatson, Chairman of the Scottish Branch of the British Red Cross Society, was established in Scotland as a branch of the Directorate of Voluntary Aid Organizations.

In this and other directions the directorate provided a much-felt want in co-ordinating voluntary effort. Indeed, the chief lesson which the war teaches with regard to the organization of voluntary aid to medical services in time of war is the importance of peace organization in close touch with and co-ordinated by the military authorities. It was owing to the fact that this association and control existed in connection with voluntary aid detachments that they fell into their places without confusion and were invaluable from the earliest days; but it was the absence of this association and control which caused that state of confusion and friction which was acknowledged to exist in other directions after war was declared.

The subsequent development of voluntary aid on behalf of the sick and wounded under the Joint War Committee of the British Red Cross Society and Order of St. John was far reaching. Most valuable and highly appreciated work was organized by it and its commissioners in all theatres of war, and in the allied countries. Its activities were mainly directed towards the establishment of depôts for distributing comforts and special articles of equipment to military hospitals, provision of recreation huts, invalid kitchens, ambulance cars, and motor boats, in connection with medical services generally, packing and forwarding of parcels to interned prisoners of war in enemy countries, the institution of workshops and other means of technical training for those interned in neutral countries, assistance to the victims of war amongst the civil populations, and helping relatives in obtaining information regarding the missing. All these activities were in addition to the work carried out in the United Kingdom in connection with auxiliary hospitals through the county directors of voluntary aid organizations, with the establishment and maintenance of Red Cross hospitals and officers' convalescent homes, the organization of war libraries, and the after-care of disabled soldiers. These and other details of the immense extent of its work will be found in the report of the Joint War Committee, and in the history of the medical services of the various expeditionary forces.

CHAPTER XII

DEMOBILIZATION.

THE medical services had several important functions to perform in connection with demobilization. Measures had to be taken for the disinfection and disinfestation of men and their clothing before transfer to the United Kingdom; for medical examination of men claiming compensation in consequence of disability; for the disposal of the hospital populations overseas and in the United Kingdom; for the disposal of medical and surgical stores; and for the demobilization of medical units and medical personnel.

The measures of disinfection and delousing of healthy men were conducted in theatres of war before embarkation for the United Kingdom, but it was anticipated that large numbers would disembark in British ports in a verminous condition, especially from more distant theatres of war and at the commencement of demobilization. Special arrangements for their disinfection were consequently to be made at the ports of disembarkation by the military authorities of the commands concerned. Details of the general measures for delousing are described in the volumes on the Hygiene of the War. Generally they followed the quarantine methods employed by the Japanese for the troops returning from Manchuria on the termination of the Russo-Japanese War.*

On arrival in the United Kingdom drafts for demobilization were sent to dispersal stations, specially organized for demobilization purposes in each command, but before leaving their units each officer and man had to be examined medically to ensure that he was fit to travel and free from infection, and in order to have his medical category reviewed and revised where necessary. Each officer and man had to declare on a certificate form that he did or did not claim compensation for disability. If he did, the medical officer of the unit had to examine him with reference to his claim and complete the form of statement of disability in order to assist the Ministry of Pensions in subsequently adjusting the amount of compensation.

With regard to the dispersal of the hospital population, the policy adopted was to demobilize all sick and wounded who had

* *See* Report No. 36 of "Medical and Sanitary Reports of the Russo-Japanese War," published for H.M. Stationery Office, p. 463, *et seq.*

been more than 28 days in hospital and to return to their units those who were fit for duty within 28 days. Everyone so demobilized had to appear before a medical board, when his disability was fully recorded in medical board proceedings, which for the hospital population took the place of the statement of disability of officers and men who were demobilized from their units. For this purpose certain large hospitals in each command, usually the principal central hospitals, were selected as dispersal hospitals, and a medical board consisting of an equal number of medical officers appointed by the War Office and Ministry of Pensions was allotted to each. The main duty of these boards was to determine the necessity or otherwise for further indoor or outdoor treatment, which might be provided by the Ministry of Pensions; to recommend for the discharge, under existing procedures of invaliding, of officers and men who were permanently unfit for further service; and to assess disability pensions either finally or temporarily. In the event of disagreement amongst the members of the board, cases were to be referred to a standing appeal board and the patients retained in hospital pending its decision.

At first there were some fifty dispersal hospitals, and it was intended that patients should be transferred to the dispersal hospital nearest their homes. The number was gradually reduced as the numbers of sick and wounded for disposal diminished. The constitution of the dispersal medical boards was also altered, at first to two officers R.A.M.C. and one representative of the Ministry of Pensions, and afterwards to three officers R.A.M.C. and no representative of the Ministry of Pensions.

The procedure for concentrating the hospital population in dispersal hospitals was to evacuate to the United Kingdom all sick and wounded from overseas, whenever shipping was available, provided they were in need of at least 14 days' hospital treatment from the date of embarkation; and to transfer from affiliated to central hospitals or appropriate special hospitals the patients in the United Kingdom who were likely to require more than 28 days' treatment. Sick and wounded, thus concentrated, were discharged from the service, if permanently unfit, by the standing invaliding medical boards of the hospital, others were transferred as accommodation became available to the dispersal hospitals, with the exception of those requiring transfer to special hospitals or patients of the Dominion or American forces, who were transferred to their own hospitals.

By these means the auxiliary and affiliated hospitals were gradually closed and subsequently, too, those central hospitals

which were not required as dispersal hospitals.* Special hospitals, which were required for prolonged treatment of disabled men, were eventually taken over by the Ministry of Pensions, but for a considerable time after peace with the Central European Powers was signed they remained under the charge of the Army Medical Service.

The sick and wounded in convalescent hospitals were disposed of in the same manner as the patients in the affiliated hospitals. Officers and men in command depôts were disposed of through the military dispersal stations unless requiring hospital treatment, when they were transferred to central hospitals. In this way the convalescent hospitals and command depôts gradually closed.

With regard to the disposal of medical stores, boards took stock in the first instance of all stores in possession of medical units, conditioned them and classified them into serviceable, repairable and unserviceable. Serviceable stock was retained for issue as required ; repairable was packed and sent to base depôts of medical stores in the United Kingdom ; the unserviceable stores were handed over to the Salvage Department.

The base depôts had to be very largely expanded for the reception of these stores. They were divided into 14 sections comprising different classes of stores, such as medicines, vaccines and sera, tablets, surgical dressings, rubber and waterproof goods, surgical appliances and spectacles, surgical instruments, operation room furniture, field equipments, X-ray apparatus and appliances, dental apparatus and appliances, chemical and bacteriological apparatus, packing cases and bottles, stationery and ordnance stores.

Medical units not required for the *post bellum* army were demobilized by reduction to a cadre establishment until their medical and ordnance stores and equipment had been disposed of, the surplus personnel being posted either as reinforcements to units which were being retained, or sent to the dispersal stations in the United Kingdom for demobilization in accordance with the general instructions.

The demobilization of medical officers was carried out under special instructions and presented many difficulties. In considering the steps taken to bring about their demobilization the policy of the War Office was largely dictated by the civilian bodies which had been set up during the war with a view to providing civilian medical men for service with the army, and also by the fact that although the great majority of officers were liable to be retained compulsorily until the statutory

* The rate of demobilization of hospital accommodation is shown in the chart of hospital beds in Chapter V.

date for the end of the war, in actual practice public opinion after the declaration of the Armistice demanded prior consideration for the needs of the civilian population and even for the claims of individual medical officers.

Hospital populations, however, did not diminish *pari passu* with the demobilization of the rest of the army, and the garrisons which remained in occupied enemy countries consisted largely of small bodies of troops scattered throughout wide tracts of country, thus requiring a very much larger proportion of medical officers for field duties, sanitation, and other medical requirements, than had been the case when the troops were more or less concentrated as armies in the field.

Some time prior to the declaration of the Armistice it was realized that special machinery would be required for the demobilization of the officers of the Royal Army Medical Corps and that the general machinery of demobilization, although suitable in the case of other ranks of the Corps, would not be applicable to them. There were, broadly speaking, three methods, any one or any combination of which might be adopted in deciding upon a scheme of demobilization of medical officers :—

(1) To release the greatest possible number in the shortest time, by ordering the demobilization of every medical officer immediately his services were no longer essential for local requirements.

(2) To release officers from each command or expeditionary force according to length of service, age, and urgent family affairs.

(3) To release only those officers whose demobilization was urgently required on account of the needs of the civil population in the localities in which they had practised before joining the Royal Army Medical Corps.

It was believed that the essential factor for rapid demobilization would be to retain as far as possible officers who could not be spared without being relieved by others, and to release immediately those who could be spared, thus avoiding the necessity for constant movement of officers and handing over of duties. If a policy of this kind were acted on it was obvious that the greatest possible number in any given period would be released by the first method and the next greatest number by the second method, as offering a wider selection of eligible individuals than the third method.

Unfortunately, at the time of the Armistice the civil population, which had been seriously depleted of medical men, was menaced by the danger of an epidemic of influenza making the immediate

return of a large body of medical men to civil life a matter of the greatest urgency. It was therefore decided that the Medical Department of the Ministry of National Service and through them the Central and Local Medical War Committees, which had been mainly instrumental in supplying medical men for service in the army, should reverse their functions and provide for the restoration of medical men from the army to civil life.

The War Office and the Ministry of National Service in considering the best method of demobilization came to the conclusion that the first method would be unsatisfactory, both from the point of view of the individual officer and of the civil community, but, while the War Office favoured the second method as releasing the greatest number of officers consistent with the principle of demobilizing first those with the greatest claim to consideration, the Ministry of National Service favoured the third method as a means of returning most rapidly to civil life those medical men who had large panel practices.

Consequently, in view of the serious epidemic of influenza, the third method was adopted and the following machinery set in motion. The Local Medical War Committees forwarded to the Central Medical War Committee the names of those practitioners who were most urgently required in their own localities. The Central Medical War Committee considered these lists and made recommendations to the Ministry of National Service, who forwarded the names to the War Office in the order in which release was desired. The War Office then forwarded the names to the commands in which the officers were serving, and they were then released as early as possible in the order in which their names were received. Foreseeing that there would be considerable delay in releasing large numbers if this system were adopted in its entirety, the War Office advocated a compromise between the second and third methods of release, 50 per cent. of those released to be from names submitted by the Ministry of National Service, and 50 per cent. from amongst officers selected by the commands concerned with a view to demobilizing as early as possible officers who claimed priority of release on account of length of service and other personal considerations. The Ministry of National Service could not, however, agree to this on the grounds that the release of those officers whom they had demanded by name would be delayed by the demobilization of any others. Consequently, demobilization was confined to those whose release had been demanded by that Ministry.

As had been foreseen by the War Office authorities, this

system of demobilizing medical officers was unworkable and involved constant movement and replacement of officers and the consequent handing over of duties. In many cases, no sooner had an officer taken over the duties of one whose release had been requested than he himself was demanded, and it became necessary again to hand over the duties. Further, many of those whose release was asked for were serving in distant theatres of war and either could not be spared without a relief, or could not be sent home on account of lack of shipping, or were specialists who could not be spared. Moreover, the demands for the release of officers were frequently based on the fact that they held special qualifications. For example, mental specialists were required for the Board of Control, venereal experts for the Ministry of Health, and orthopædic surgeons for the Ministry of Pensions, whereas the number of cases which these officers were required to treat in the army showed very slight decrease or even in some cases an increase for a long time after the Armistice.

It was during this phase of demobilization that the card index, which had been so laboriously completed during hostilities, proved of the utmost service. Not only had complete details of every officer and where he was serving been entered on his card, but there was also a record of his special qualifications and any special duties he had been or was actually performing at the time. With the information available from the cards it was possible, therefore, to find substitutes for many of the officers employed on special duties, although these substitutes were not at the time employed as specialists.

Representatives of the Director-General of the Army Medical Service attended many conferences at which representatives of all the different civilian bodies were present, and frequently pointed out that the only way to return medical officers to their civil duties with any degree of rapidity was by allowing the War Office to nominate those who could best be spared. In fact, a definite promise was given that, if the Ministry of National Service would agree to this, 2,000 medical officers would be returned within a very short time. This, however, was not agreed to, and, as a result, only 2,531 medical officers had been demobilized by the 11th March, 1919. The situation in civil life had then become so serious that the Secretary of State for War, in consultation with the Minister of National Service, handed over the whole system of demobilization of medical officers to the Director-General of the Army Medical Service.

It was then estimated that, with a free hand, 2,000 could be released, and in fact between the 11th March, 1919, and the

8th April, 1919, the number demobilized rose to 5,463, a total of 2,932 having been released in four weeks. The situation in civil life was eased by this large influx of doctors, and demobilization was subsequently carried out by a combination of the second and third methods, the arrears of those who had been demanded and whose release was still outstanding being cleared off concurrently with the release of those who had been selected by the General Officers Commanding in Chief of the various forces on account of length of service, age, and family requirements. A great many officers who had served since the first year of the war were, for one reason or another, not demanded by the Ministry of National Service, and it had been hoped that as soon as the Ministry's demands had been cleared, it would have been possible to release them.

By the time 9,070 had been released, the number of medical officers employed had been reduced to a minimum, and the demobilization of other arms had become very much slower. Consequently it was found that medical officers then could only be released very slowly and at such times as reductions were made in the army generally. In order to hasten their release, however, new contracts for shorter periods were offered to civilian doctors who had just qualified or who, after their return to civil life, were anxious to rejoin the Royal Army Medical Corps, those who responded being posted to the various forces in relief of others who were anxious to return to civil life.

Had this system of release, which had been advocated throughout by the War Office, been adopted from the outset of demobilization it is probable that not only would a great deal of dissatisfaction have been avoided among medical officers with long service who saw comparatively young men with sometimes only a few months' service released on demand by the Ministry of National Service, but the civil situation would probably have been relieved much more rapidly, as was proved to be the case when the system of demanding by name was discontinued. In isolated and very exceptional cases it would have been necessary, whatever system had been in force, to demand certain individuals by name, but the number so demanded would have been limited and would have been the subject of close investigation by the Ministry of National Service.

In offering new terms of temporary commissions in order to replace released officers it was realized that after five years of war most medical men were anxious to return to civil life and that young men who were qualifying would be more anxious to prepare themselves as rapidly as possible for their

future occupation by accepting appointments in civil hospitals than by serving for an uncertain period as officers of the Royal Army Medical Corps. Consequently increased emoluments in the form of a contract providing for pay at the rate of £500 per annum for those joining for the first time and £550 for those who had served previously for a period of not less than one year were offered and employment for one year was guaranteed. This contract came into force on the 1st August, 1919, but so small was the response that it immediately became necessary to offer further increases and in September the terms were raised to £600 and £650 per annum.

When this contract was proposed it was strongly urged by the Director-General that it should, like the previous one, provide for employment for a period of not less than one year, but after considerable discussion this was overruled and the period of employment was fixed at six months. This shorter period added greatly to the difficulties of the medical department at the War Office in connection with the provision of personnel for the medical requirements of forces occupying distant theatres of war. It was impossible to send officers on so short a term to the Far East, and reliefs for those in Mesopotamia, who though in every way deserving of consideration in respect of early demobilization could not be spared without relief, were not possible. Every effort was made to release them but, although every regular officer who could be spared was sent to Mesopotamia, the numbers available fell far short of those required. The compulsory retention of Special Reserve, Territorial Force and temporary officers in that country consequently gave rise to much dissatisfaction, an endless amount of correspondence and numerous questions in Parliament.

Moreover, delays in shipping were serious and it was frequently the case that an officer, who had joined for six months and for whom a passage had been asked immediately on joining, had not embarked until half the period of his contract had expired, and it was, therefore, necessary to cancel his orders and to continue to employ him on home service until such time as his contract expired. In these circumstances it was only by reducing the number of medical officers in garrisons and expeditionary forces to a dangerous point that a certain turnover could be maintained and demobilization proceeded with.

For a considerable time after the Armistice the work in the home hospitals diminished only very slightly. Large numbers of sick were being evacuated from the various expeditionary forces, and the Ministry of Pensions had not yet taken over

pensioner cases. In order to maintain a proportionate rate of demobilization at home, it was necessary, therefore, to post junior officers, who were discharged to duty from hospital or had returned from overseas, to the Home Commands in relief of others whose release had been demanded by the Ministry of National Service. The services of part-time civil medical practitioners were also utilized to the greatest possible extent and not only brought about the release of a greater number of officers than would otherwise have been possible, but also gave some financial assistance to those who had recently been demobilized and who were picking up the threads of their practices. They were given preferential treatment in selecting civil practitioners for part-time work with the army.

The work of demobilizing several thousand medical officers involved endless correspondence, personal interviews and many other matters connected with their return to civil life. The number of questions and enquiries reaching the medical department of the War Office regarding the release of officers, both from private correspondence and from public bodies, ran into many hundreds daily, and in order to keep an accurate and accessible record of each officer's situation as regards release, it was necessary to start a demobilization card index. A card was made out for each officer whose name was submitted for release. The cards were then sent to the main index and divided into batches according to the theatres of war in which the officers were serving and these batches of cards were used as nominal rolls in typing telegrams for ordering release and in notifying the Ministry of National Service of the action taken. The fact that this had been done was then entered on the cards. On completion of the preliminary action the cards were incorporated in the demobilization index in alphabetical order for any further entry, such as "embarked for United Kingdom," which would be recorded in due course and available in replying to further enquiries regarding the officer's progress towards release. On demobilization being completed the card was withdrawn to an index of demobilized officers. The remaining cards, which would consequently be those of outstanding cases, were reviewed monthly and reminders were sent to the commands concerned. This system not only reduced by half the clerical labour but also enabled the enormous number of enquiries to be answered promptly. The superiority of the card index system in dealing with large numbers of individuals and masses of correspondence was thus amply demonstrated. Without its adoption, not only would demobilization of medica

officers have been very seriously delayed, but it would have been impossible to answer the innumerable enquiries or to produce evidence in justification of the policy adopted by the medical department of the War Office, which at that time became the object of frequent and bitter attacks both in the Press and by public bodies.

Up to the 1st of June, 1920, the total number of medical officers who were released from service with the Royal Army Medical Corps, including those of the United States of America and Dominion Medical Services, was 11,627.

The demobilization of other ranks of the Royal Army Medical Corps was carried out as already stated on the lines laid down for the rest of the army, and, as all instructions were issued by the Mobilization Directorate, no special machinery was necessary in the medical department of the War Office. Nevertheless it was of the greatest importance that an accurate check should be kept on the total numbers released and that it should be possible to follow the progress of demobilization in relation to the reduction of hospital beds.

Shortly after the Armistice it was necessary to effect the release of the largest possible number of the other ranks of the Royal Army Medical Corps, eligible for demobilization, with the least possible delay. The main causes which retarded demobilization were the delay in the surrender of hospital beds, when viewed in conjunction with the decline in hospital population, and the small number of units closed down since the date of the armistice. These points were brought to the notice of the deputy directors of medical services in the home commands in a circular letter issued by the Director-General on the 3rd of May, 1919. It was pointed out that Royal Army Medical Corps personnel should be available for demobilization by a redistribution of personnel not eligible for demobilization, and that men of the R.A.M.C. should be demobilized in priority to voluntary aid detachment general service women, as the slow release of the men was causing grave concern at the time. Further, at the time the letter was written, 11,000 of the R.A.M.C. were being retained for the military machinery of demobilization, a state of affairs which it was impossible to justify.

A few weeks later a further letter was sent to General Officers Commanding all commands at home stating that it had been decided to base establishments on the number of equipped beds only in special hospitals and in those selected for the reception of convoys, and in all others on the number of occupied beds. In estimating requirements the proportion of personnel to be retained was not to exceed one officer to

75 beds, 20 other ranks to 100 beds, and, where voluntary aid detachment general service women were also employed, a combined total of subordinate personnel of 25 to 100 beds.

As a result of these instructions and of the careful system of checking establishments, not only of commands as a whole but of individual units, large reductions took place, and from then onwards the number of demobilizable men previously retained as necessary for the machinery of demobilization showed a steady decrease. This was aided by the rapid decreases which were now taking place in the hospital population, by the employment to the greatest possible extent of voluntary aid detachment general service and labour women, and later, as demobilization progressed and recruiting for the R.A.M.C. fell far short of the numbers required, by the general employment of civilian hospital orderlies.

The system of checking establishments employed was made as automatic as possible and charts were compiled from weekly returns showing the numbers of officers, other ranks and women continuing to be employed and the number required for the medical care of sick and wounded, medical charge of troops and miscellaneous duties. This could otherwise have been done only by the examination of masses of returns.

As a result of this system it was found that any waste of personnel in commands immediately came to notice, but it was only by continuous telegrams, letters and instructions to commands that staffs were maintained at the minimum consistent with efficiency.

One of the greatest difficulties encountered was the disposal of ordnance and medical stores after a unit had been closed for the treatment of patients. The long delays which occurred meant the continued occupation of costly premises and the employment of a nucleus staff, including usually a senior officer who was responsible for the stores, sometimes for many months. On any future occasion it should be possible, by a closer liaison between the various departments to secure the rapid closure of all units and consequent early release of staff and buildings.

Graphic charts were maintained in the Director-General's office showing the demobilization of subordinate ranks of the Royal Army Medical Corps, of voluntary aid detachment general service women, and of Royal Army Medical Corps officers and civil medical practitioners. Originally it was the practice to rely upon the receipt of a demobilization form as notification of an officer's release, but the delay in the receipt of this form was so great that it was found impossible to keep the progress of demobilization both

of individuals and of Royal Army Medical Corps officers as a whole up to date. Commands were therefore instructed to telegraph to the medical department at the War Office the name and date on which each medical officer ceased to perform military duties and records were compiled from these telegrams and later confirmed on receipt of the army form. This served a double purpose. It not only showed the decrease in medical officers in each command day by day, but it helped to distribute to commands those medical officers who were returning from expeditionary forces but whose turn for demobilization had not yet arrived.

Members of the nursing services, of voluntary aid detachments and general service voluntary aid detachments were also demobilized under special instructions. Generally the procedure was the same as for officers and other ranks. Dispersal hostels were opened at Folkestone* for those from France and Italy, and at Brockenhurst for those from other theatres of war. The matron in charge of a hostel then carried out the duties of dispersal on the same lines as those laid down for an officer in charge of a dispersal station.

* Transferred in October, 1919, to the Connaught Club, London.

CHAPTER XIII

THE MEDICAL SERVICES IN THE MEDITERRANEAN GARRISONS

THE Mediterranean garrisons, Malta and Gibraltar, formed medical bases to which sick and wounded from Mediterranean theatres of war were evacuated.

MALTA.

The medical work in Malta during the early months of the war consisted of the ordinary routine work of a peace garrison. Malta fever, which in the past had thrown a considerable amount of strain on the medical services, had been eliminated for some years before the war, and the garrison was a healthy garrison, so that the medical work during these early months was easy. At the time war was declared there was no indication that active operations would take place in any theatre of war on the Mediterranean littoral, at any rate so far as Great Britain was concerned, and officers and men of the regular R.A.M.C. were withdrawn for active service elsewhere. The peace medical establishment was 23 officers including two quartermasters, 150 other ranks R.A.M.C., and 12 members of the Q.A.I.M.N.S.

As the British infantry battalions were withdrawn their place was taken by the two battalions of Malta Militia, and by battalions of the Territorial Force from England. The latter were accompanied by four R.A.M.C. (T.F.) officers, and four officers and 193 other ranks of the 1st City of London Field Ambulance (T.F.). Consequently before there was active need of hospital expansion these formed the bulk of the military medical personnel on the island.

Colonel M. W. Russell, the D.D.M.S., as noted already, returned to England in September, 1914, and was not replaced at the time. The duties of D.D.M.S. were carried out by Lieut.-Colonel Sleman, R.A.M.C. (T.F.), who came to Malta in command of the 1st City of London Field Ambulance. Lieut.-Colonel C. C. Cumming, R.A.M.C., acted as his D.A.D.M.S.

The military hospitals in Malta before the war period were four in number. The main hospital and headquarters of the R.A.M.C. was the military hospital at Cottonera, with 278 beds, and there was a comparatively modern hospital in the centre of the island at Imtarfa with 55 beds. At Forrest there was

a small hospital of 20 beds, chiefly for venereal diseases, in an old monastery surrounded by high walls enclosing an old time garden. In Valetta itself, what had been in days gone by the largest and oldest military hospital in the island with its famous ward 505 feet in length, once the principal hospital of the Knights of Malta, and capable of accommodating some 300 beds, had been reduced to a hospital of 36 beds, of which all but ten formed a hospital for Maltese troops, known as the Royal Malta Artillery Hospital. There was also a small military hospital at Fort Chambray in the outlying island of Gozo, and a large naval hospital at Bighi near the Cottonera military hospital.

The first indication of the probable use of Malta as a hospital base in the Mediterranean came on the 24th February, 1915, when a telegram was received from Egypt enquiring to what extent Malta could provide hospital accommodation. Five hundred beds were immediately offered, but a few days later, on the 3rd March, information was received from Egypt that the accommodation would not be required.

The imminence, however, of operations taking place in the Dardanelles induced Lord Methuen, the Governor and Commander-in-Chief in Malta, to initiate the preparation of a scheme locally for expanding its hospital accommodation to 3,000 beds and for forming a convalescent depôt for 500 in Gozo. The scheme was forwarded to the War Office for sanction on the 14th March, 1915, as well as to the General Officer Commanding in Egypt, and preliminary measures were taken to give effect to it. On the 19th March, 1915, the Commander-in-Chief was asked if Malta could receive 500 venereal patients from Egypt. Arrangements were made at once and the men arrived within a fortnight.

There was not, however, at this time any indication from Egypt of the need of any great expansion of hospital accommodation in Malta, but this did not prevent the military authorities from carrying out the preliminary arrangement for providing 3,000 beds, the provision for 1,200 of which was sanctioned by the War Office on the 12th April, 1915.

When the expeditionary force landed in Gallipoli on the 25th April, 1915, it was evident that the scheme would have to be put into operation immediately and to its fullest extent. The first convoy of wounded, numbering some 600, arrived on the 4th May, 1915, and convoys continued to arrive during the month, so that by the end of May the number of sick and wounded in the island exceeded 4,000.

Local arrangements were then commenced to increase the hospital accommodation to 7,000 beds. Sir Frederick Treves

OF HOSPITALS AND CAMPS IN MALTA.

REFERENCE.

- Hospitals.
- Convalescent Camps.
- Small Hospitals in Private Buildings.
- Roads.
- Railways.

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visited Malta at this time and recommended the formation of a hutted hospital for 2,000 beds on the Marsa. This was a low-lying site at the head of the Grand Harbour, liable to flooding by rain. This site was strongly objected to by the local authorities.* Consequently when, in accordance with the recommendation, 34 huts were sent out from England, a site was selected for them on higher ground near St. Andrew's barracks, overlooking the rifle ranges at Pembroke, where they were eventually erected by the end of October, 1915, and designated the St. Paul's Camp Hospital.

By the end of June, 1915, 2,000 more sick and wounded arrived in Malta, but, notwithstanding this, the numbers in hospital did not exceed 4,000, as about 1,000 had been evacuated to England and about the same number had been returned to Egypt. The numbers, however, steadily increased during the next three months, and by the end of September had reached 10,517. During the previous three months over 22,000 sick and wounded had arrived in Malta, 13,000 had been transferred to England, and 3,500 sent back to Egypt as fit for service. Work in the hospitals was very heavy during this period, for in addition to battle casualties many of the men were suffering from dysentery and fevers of the enteric group. During October, November and December, 1915, sick and wounded continued to arrive from Gallipoli at the rate of about 2,000 weekly, and in one week in December as many as 6,341 were landed in Malta.

At the end of 1915 owing to the evacuation of Gallipoli the medical situation in Malta was completely altered for a time. Although sick and wounded began to arrive from Salonika the number was not then great and the importance of Malta as a hospital base diminished. In February, 1916, only 600 sick and wounded were received, and in March 1,500. By the end of the month there were only 4,000 in the Malta hospitals, although the accommodation at that time amounted to 20,000 beds. It was consequently decided to reduce the hospital accommodation to 12,000 beds at the end of March, and for the next three months the medical services in Malta passed through a period of comparative inactivity; the numbers in hospitals and convalescent depôts fluctuating between 3,000 and 5,000.

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* Heavy rains in November completely flooded the Marsa in four hours during the night. The local military and medical authorities were not only justified in their opposition to the site, but they also opposed the use of huts, as being unsuitable for occupation during the hot weather in Malta. They were in favour of temporary stone buildings, which they considered could have been constructed more quickly.

In July, 1916, the outbreak of malaria amongst the troops in Macedonia made it necessary not only to restore the hospital accommodation which had been provided for sick and wounded from the Dardanelles, but to increase it still further. Convoys arriving in July, 1916, numbered 718, 1,982, 2,605 and 2,587 in successive weeks. During that month the hospital and convalescent depôt accommodation was raised to 15,486 beds, and eventually to 25,570, with a scheme for further expansion to 27,000. This expansion was effected by adding beds, chiefly by means of tentage, to the hospitals formed in 1915, instead of by the formation of new hospitals.

In 1917 a new situation was created. Submarine attacks on hospital ships in the Mediterranean made it unsafe to continue evacuation from Salonika to the same extent as previously. The policy was then adopted of retaining sick and wounded in Salonika, and increasing the hospital accommodation there. Five general hospitals consequently were ordered to mobilize in Malta for service in Salonika.* They left during May, 1917, and the accommodation in Malta was reduced to 12,932 beds. The effect of the new policy on Malta was soon felt, for in May, 1917, only 603 sick and wounded arrived as compared with 2,543 during the previous month. In June only 37 arrived, in July 842, and in August 401. At the beginning of May, 1917, 14,537 sick and wounded were in the Malta hospitals and at the end of August only 5,465.

The importance of Malta as a hospital base was thus permanently diminished, but it had fulfilled its purpose well during the two phases of maximum activity; namely, during the Dardanelles operations in 1915, and during the period of malarial prevalence in Macedonia in 1916. In 1915, 2,550 officers and 55,400 other ranks were received from the Gallipoli expeditionary force, the maximum number in hospital on any one day being 16,004. From Salonika 2,600 officers, including members of the nursing services, and 64,500 other ranks were landed up to August, 1917, the majority arriving during the summer and autumn of 1916.

From September, 1917, to October, 1918, the hospital and convalescent depôt accommodation was gradually reduced from 12,932 to 7,734 beds. The epidemic of influenza in 1918 caused a slight increase to 9,218 beds in November, but afterwards a rapid reduction was made by evacuation of sick and wounded to England, so that by February, 1919, only 476, equipped hospital beds remained in the island.

* These hospitals became the 61st, 62nd, 63rd, 64th, and 65th General Hospitals with 1,040 beds each, completely equipped and staffed from Malta.

A feature of historical interest in connection with Malta as a great hospital base during the war is the fact that the hospitals and convalescent depôts were not provided by the mobilization of general or stationary hospital units from the United Kingdom, but were entirely of local constitution, personnel and equipment being sent from England as required. The policy was thus in a sense local and did not necessitate much reference to the War Office authorities or other commands.

Individual hospitals were classified in four groups, namely those expanded from existing hospitals, hospitals opened in vacated barracks, hospitals in civil buildings, and hospitals formed in camps.

The first group consisted of the Cottonera, Forrest, Valetta, and Imtarfa hospitals.

The expansion of the Cottonera hospital was effected by conversion of the verandahs and R.A.M.C. barracks into wards, the beds being increased in this way from 167 to 432. A further expansion to 802 beds was made in October, 1916, by tentage. This hospital remained throughout as the principal hospital for surgical cases.

The Forrest hospital was retained in its original rôle as a hospital for contagious diseases, and was expanded from 30 to 186 beds, mainly by tentage.

The Valetta hospital was expanded by re-opening and refitting the large disused wards, and, at its maximum expansion, provided 524 beds. It was used generally as a hospital for medical cases.

The Imtarfa hospital adjoined the Imtarfa barracks and became merged in the hospital opened in the latter. It was on the healthiest site in the island on the high ground in the centre of Malta. A large new military hospital was in process of construction there to replace the hospital at Cottonera, but it was not sufficiently advanced to be used during the war.

The second group of hospitals was in the infantry barracks at Imtarfa, St. George's, St. Andrew's, and Floriana, in artillery barracks at Tigné and Ricasoli, and in old buildings or huts in Bavière and Fort Manoel.

At Imtarfa 300 beds were equipped in the barracks at the beginning of April, 1915, specially for the venereal patients sent from Egypt. Subsequently more barrack rooms were equipped, until in October, 1916, a maximum hospital accommodation of 1,853 beds had been reached. This number of beds was maintained till August, 1917, when there was a slight reduction. The hospital was finally closed in February, 1919. It was used mainly as a hospital for dysentery and other infectious

diseases. The number of cases of the enteric group which arrived from Gallipoli and Salonika was comparatively small, and dysentery cases occupied most of the beds.

In St. George's barracks a non-dieted hospital, with barrack room equipment, was opened for slightly wounded in May, 1915. It became a fully equipped dieted hospital by September, when the number of beds was increased from 840 to 1,000. A further expansion was made chiefly by tentage in July, 1916, reaching a maximum of 1,412 beds in September of that year. This hospital was closed at the end of October, 1917.

St. Andrew's barracks were handed over to the Royal Army Medical Corps on the 6th May, 1915, and opened as a hospital three days later. By the 12th May 845 beds had been equipped and 300 patients admitted. By the end of the month 1,172 beds were ready. Further expansion up to 1,258 beds was made by adding tentage, and maintained until March, 1916. The accommodation was then reduced to 1,070 beds, but again expanded by tentage in July and August, 1916, to 1,782 beds. This number was maintained till August, 1917, when gradual reduction commenced and the hospital was closed on the 21st January, 1919. Like the Imtarfa hospital, it was used chiefly as a hospital for dysentery after September, 1915.

The hospital in the Floriana barracks, just outside Valetta, was opened in June, 1915, with 600 beds and increased to 700 in November. It was closed in April, 1916, but re-opened with 704 beds in September of that year. In December, 1916, the accommodation was increased to 1,304 beds by erecting hospital marquees on the parade ground. The hospital was finally closed on the 30th April, 1917. The majority of the cases treated in it were cases of severe wounds requiring operative treatment, as it was conveniently situated for reception of cases disembarked in the Marsa Muscetto or Grand Harbours. There were three large barrack blocks of recent construction which could be converted into good hospital wards. The officers' mess and adjoining buildings were used as a home and hospital for nursing sisters.

Tigné barracks became a non-dieted hospital for slightly wounded on the 2nd May, 1915. It was fully equipped as a dieted hospital of 600 beds in the following month. The number of beds was increased to 736 between November, 1915, and March, 1916, when they were again reduced to 600. In July, 1916, a further expansion took place by tentage to a maximum of 1,412 beds. The hospital was kept open till 6th January, 1919. The barrack rooms were of modern construction and were well adapted for hospital purposes.

The cases treated at Tigné at first were chiefly the slightly wounded, the site being an open, healthy one, well suited for rapid convalescence.

The hospital at Ricasoli was opened in October, 1915, with 800 beds, of which 224 were in the barrack rooms and 576 in tents on the parade ground. It was closed on the 19th February, 1916.

A small special surgical hospital was opened in the Auberge de Bavière in June, 1915. It was an old building which had been used as the headquarters of the Command Paymaster shortly before the war, and previous to that as an officers' mess. It was conveniently situated in Valetta facing the Marsa Muscetto Harbour. The number of beds was 105, which were increased to 155 in August, 1915. The latter number was maintained until the hospital closed on the 14th August, 1917. It was used from the beginning as a hospital for severe surgical cases, and especially for the reception and treatment of surgical injuries of the head and spine.

The hospital at Manöel was opened in November, 1915, in an old fort and in barrack huts and tents. It was equipped for 1,184 beds by December. In April, 1916, the accommodation was reduced to 100 beds, but had to be increased again in August, 1916, to 600, and in February, 1917, to 850. The hospital was closed on 2nd December, 1918. It was at first used for cases of scabies and was also available at any time as a military quarantine station.* It was, however, never necessary to use it for this latter purpose during the war, and it was used mainly as a hospital for ordinary sick. It was also used on various occasions for shipwrecked passengers and crews. The civil quarantine station was used as an officers' hospital of 80 beds.

The third group of hospitals was in camps at St. David's, St. Patrick's, St. Paul's, and in a disused fort at Spinola, between Sliema and St. Julian's Bay.

St. David's was a tented hospital for 1,000 beds situated near the St. Andrew's barracks. It was opened on the 25th July, 1915. In April, 1916, the beds were reduced to 400, but were increased again in July, 1916, to a maximum of 1,168, and maintained at that number till the closing of the hospital at the beginning of May, 1917.

The hospital at St. Patrick's in equipment and general features was similar to that at St. David's, but it was situated

* Fort Manöel, which is a small island in the harbour of Marsa Muscetto, was connected by a bridge with the mainland at Sliema. It was used before the war as a hutted camp for troops, and, on the side facing Valetta, as the quarantine station of the civil government.

on terraced farm-land in the centre of the island. It opened with 1,000 beds on the 15th August, 1915, 54 beds were added in the following October, and it was reduced to 500 beds in April, 1916. It was again expanded in the following summer to 1,168, and eventually closed at the end of April, 1917. It was re-opened, however, with a maximum of 700 beds for a short period during June and July, 1917. A large farm-house on the site was used as a nursing sisters' mess and as store-rooms.

The camp hospital at St. Paul's was formed of the huts sent out by the War Office. Two hundred and forty beds were ready at the end of August, 1915, and the full number, 792, in November. A slight reduction was made in April, 1916, followed by a maximum expansion in the following August to 898. The hospital was closed at the end of April, 1917.

Spinola was a disused fort, but the hospital opened there was under canvas, on the glacis, the fort buildings being used for stores and administrative purposes. One thousand beds were ready early in November, 1915, but they were not actually used till January, 1916, and then for 169 patients only. It was closed in the following March, but was re-opened with 300 beds in September and expanded to a maximum of 1,168 beds in October, 1916. This accommodation was maintained until the hospital closed at the end of April, 1917.

The fourth group of hospitals was in a small nursing home, known as the Blue Sisters; in a technical school at Hamrun; in the vacant Jesuit College of St. Ignatius; and in civil government schools at St. Elmo and St. John's. The Blue Sisters' nursing home, maintained by the sisters of the Little Company of Mary, with the adjoining Clapp Zammit civil hospital, provided accommodation for 120 beds. The technical school at Hamrun was built two years before the war, but only the basement rooms had been occupied. It was opened in June, 1915, as a hospital under the British Red Cross Society with 106 beds, but became a military hospital of 80 beds for officers in November, 1915. It was closed in July, 1917. The St. Ignatius hospital was also equipped in June, 1915, and opened as a hospital for 155 beds. It was situated near Sliema and was used at first as a surgical hospital. It was reconstructed as a mental hospital in 1917, and finally closed in January, 1919. At St. Elmo two civil government schools overlooking the breakwater of the Grand Harbour were equipped with 318 hospital beds in August and September, 1915, and were kept open as hospitals till the end of 1918. The maximum number of beds was 348 in August, 1916. They were used as a hospital for surgical cases. The civil school

at St. John's outside Sliema was opened as a hospital for 400 beds in September, 1915, increased to 520 in September, 1916, and finally closed in October, 1917. The school buildings had only recently been completed, and were well adapted for hospital purposes. Although admirably suited for surgical work, it had to be used mainly for medical cases, owing to the large number of the latter arriving in Malta.

In addition to these groups of hospitals, convalescent homes and depôts were opened at Dragunara, All Saints, Ghain Tuffieha, Melleha, Verdala, and St. Antonio palaces in Malta, and at Fort Chambray in Gozo. Dragunara and Verdala Palace were used as homes for convalescent officers, the former in a villa near St. George's Bay lent by the Marchesa Scicluna, who generously provided £100 monthly for its maintenance during a period of twelve months. It had 20 beds, was opened in May, 1915, and closed in August, 1917. It was administered by the British Red Cross Society, which provided personnel and supplemented the financial assistance given by the Marchesa Scicluna. Verdala Palace had accommodation for 30 convalescent officers and was used from December, 1915, to April, 1916, only. St. Antonio Palace was maintained as a convalescent home for 50 or 60 nurses from the 8th December, 1915, to 19th March, 1916.

The convalescent depôts at All Saints, Ghain Tuffieha, and Melleha were large tented camps. The camp at All Saints was opened in June, 1915, for 1,600, but was reduced to 800 from April to June, 1916. It was then greatly expanded. In October, 1916, it accommodated 2,650 convalescents and 3,100 in July of the following year. It was finally closed in November, 1917. This large expansion was effected by forming a new camp for men who were considered fit for service but were waiting a passage. Strictly speaking they were no longer convalescents, although they were under medical charge. The site of All Saints was on high ground near St. Andrew's barracks and the camp and hospitals of St. Paul's and St. David's overlooking the Pembroke rifle range.

The Ghain Tuffieha Camp was opened in August, 1915, with accommodation for 3,000, increased in January, 1916, to 3,791. It was closed in January, 1919. It was about 10 miles distant from Valetta, on the southern coast of the west promontory of the island, and had been used as a summer camp in time of peace on account of its bathing facilities and cool breezes. For a short period immediately preceding and following the Armistice this convalescent camp was expanded to 5,000 beds in order to provide accommodation for the

large number of convalescents accumulating in the island pending evacuation to England.

The Melleha convalescent depôt was opened in February, 1916 and closed in September, 1917. During the first six months its accommodation was for 1,250, but in September, 1916, this was increased to 2,000 and maintained at that number till August, 1917. The site was that of a training camp in peace time, about 11 miles from Valetta on the northern coast of the west end of the island, where there were also ample facilities for bathing.

The convalescent depôt at Fort Chambray in Gozo was opened in the barracks there for 400 convalescents. It was originally opened in order to supplement the convalescent depôt at All Saints, but owing to its isolated position it was closed in March, 1916, when additional accommodation was no longer required.

The personnel required for the great expansion of hospital accommodation in Malta was obtained partly from local resources and partly from the United Kingdom. In April, 1915, when the process of expansion commenced, the military medical personnel had been reduced to 9 officers, 14 nurses, and 220 other ranks of the R.A.M.C. Reinforcements from England did not arrive until the 7th May, 1915, and pending their arrival the services of 27 civil medical practitioners, 11 nurses, and 65 men of the local St. John Ambulance Brigade, a body of men who had been highly trained for duty in connection with the Malta Defence Scheme and who had in the past taken part in the peace manœuvres of the garrison, were obtained. A Scottish Women's hospital unit, consisting of 4 medical women, 38 fully trained nurses, and 20 members of a voluntary aid detachment, landed in Malta on the 4th May on its way to Serbia and voluntarily assisted in the hospitals there for a fortnight before re-embarking. They were distributed between the Valetta and Bighi Naval Hospitals, where most of the seriously wounded cases had been sent. Reinforcements of 82 medical officers, 219 nurses, and 798 other ranks of the R.A.M.C. arrived during May, and by the end of September the medical personnel had increased to 240 officers, 567 nurses, and 1,760 other ranks. At the beginning of 1916 the medical personnel consisted of 334 officers, 913 nurses, and 2,032 other ranks of the R.A.M.C. These numbers were considerably reduced in June, 1916, and during the remainder of the year the work was carried on by 165 medical officers, 403 nurses, and 1,827 other ranks. In August, 1916, however, 42 qualified women doctors were sent to Malta and another reinforcement of women doctors arrived

in November, bringing the number of medical women employed up to 76. Twenty-six local civil practitioners were also employed in the military hospitals. The rank and file of the R.A.M.C. were increased to a maximum of 2,378 in January, 1917.

Consulting physicians and consulting surgeons* were appointed to Malta from time to time, as well as a consulting sanitary officer, a consulting anæsthetist, and specialists in surgery, bacteriology, ophthalmology, sanitation, dermatology, otology, mental diseases, and radiography.

Colonel Sleman continued to act as D.D.M.S. of the Command until Malta began to expand into a great hospital base. Surgeon-General Whitehead was then sent from England as D.D.M.S., and arrived in July, 1915. On his transfer to Salonika he was succeeded in April, 1916, by Surgeon-General T. Yarr, who held the appointment during the remainder of the war period.

The expansion of hospitals threw an enormous amount of work not only on the R.A.M.C. but also on the Royal Engineers and on Supply, Transport, and Ordnance Administrative Services. One of the great problems was water supply. The convalescent camp at All Saints, for example, had to be supplied at first with water carted laboriously from St. George's Barracks. A daily ration of one gallon per head only could be supplied in this way until tanks had been constructed. Fortunately the opportunities for sea bathing were good. The Royal Engineers, however, under Colonel Seaman solved all difficulties connected with water supply by increasing the storage capacity at Nadur, the waterworks of the main supply to the island. The Royal Engineers staff also completed in an incredibly short time the alterations and new works required to convert barracks, schools, and other buildings and camps into large hospitals. The resources of the island for this purpose were limited, but shortly after the war had commenced a prize ship was brought to Malta and provided a large quantity of joists, baths, water pipes, lead pipes, linoleum, and other articles which helped considerably to supplement the lack of material. The necessary works varied in the different hospitals, but included such services as the provision of sanitary annexes, ablution rooms and kitchens, the fitting up of operating theatres, X-ray rooms and dispensaries, the installation of electric light and gas for lighting and cooking, and the cleansing, colour-washing and painting of buildings. In camp hospitals

* The consulting physicians were Colonel Purves Stewart and Colonel Gulland, followed later by Colonel Garrod and Colonel Tooth. The consulting surgeons were Colonel Barker, Colonel Ballance, Colonel Charters Symonds, and Colonel Thorburn.

on rocky ground and on the glacis at Spinola much work had to be carried out to make the site suitable for tents and to fix tent pegs in concrete foundations.

As regards food supplies for hospitals, the resources of the island could not be depended on to any great extent except for fresh vegetables and fruit. Eggs and chickens had to be shipped from Egypt, Tunis, and Italy. Milk was supplied in tins from England, and for a considerable time no reserves could be accumulated.

Ambulance transport was an equally difficult problem at the beginning. There were one motor ambulance car, one motor car, one large tractor engine, and six tractors available at first, with a certain number of horse-drawn vehicles, but thirty private motor cars were placed at the disposal of the medical services until an efficient mechanical transport service could be established. In May, 1915, six Ford ambulance cars arrived; in June twenty-four more and six motor lorries. An adequate transport service was then organized for the reception and distribution of the convoys of sick and wounded. The convoys were disembarked chiefly on the quay at the dockyard in the Grand Harbour, but ships were also unloaded in the Marsa Muscetto Harbour.

Valuable voluntary help was given by the ladies in Malta, and by the Commissioners of the Joint War Committee of the British Red Cross Society and Order of St. John. At the suggestion of Lord Methuen a ladies' committee was formed to organize voluntary aid early in March, 1915. Another committee was formed in April under the auspices of the St. John Ambulance Association, and at the end of the month Captain Stockings arrived in Malta as Assistant Commissioner of the Joint War Committee of the British Red Cross Society and Order of St. John. Voluntary aid was then organized under Captain Stockings and other Commissioners of the Joint War Committee.* Ladies met each hospital ship, welcomed every sick and wounded soldier, and provided refreshment on landing. In hospital each patient was given a welcome parcel of tobacco, matches, and stationery. A large sewing party provided pyjamas, shirts, and socks. Voluntary nurses and orderlies were trained and gave much needed assistance. Voluntary workers corresponded with relatives at home and sent them information about men reported killed or missing, such as might be obtained from their comrades in hospital.

* The Joint War Committee of the British Red Cross Society and Order of St. John also sent Mr. Tindal Robertson and Lieut.-Colonel Ashley as commissioners to Malta, and Sir Courtauld Thomson, the Chief Commissioner for the Mediterranean, frequently visited the island.

In 1916 invalid kitchens were opened in connection with the hospitals at Floriana, Valetta, Tigné, St. Andrew's, St. George's, and Imtarfa. They were also completed at St. David's and St. Patrick's, but never used owing to the closing of the hospitals in 1917. Another invalid kitchen came into use at the Cottonera Hospital. Many tea and recreation rooms were established, one which was especially useful being opened by Mrs. Bonavia and a band of helpers on the sea front at Sliema in the branch of the Union Club there, and consequently not far from the largest hospital centres in the neighbourhood of Sliema and St. George's Bay. Another useful institution of a similar character was organized by the committee of the Soldiers' and Sailors' Institute in the gymnasium at Valetta. The Australian Red Cross Society gave £2,000 for the erection of a fine stone building on a site between St. Andrew's and St. Paul's hospital. It was designed and constructed by the Royal Engineers, and was capable of seating 2,000. It was opened by H.E. The Governor, as the Australian Hall, in January, 1916. Several other tea and recreation rooms were organized by Mr. Wilson and Mr. Tindall of the Y.M.C.A., the Scottish Church, the Church Army, and others. They proved of immense value in providing means of recreation to men, who would have otherwise drifted into the numberless drink shops, with which Malta abounds, and other undesirable localities.

The medical and surgical stores and other hospital equipment were sent out with personnel from the United Kingdom, but a large number of beds with bedding were lent by private individuals at the beginning of the period of hospital expansion.

The health of the garrison in Malta was good during the war. Although influenza became prevalent in June and July, 1918, it was of a mild type and there was no mortality. It recrudesced, however, in a more severe form in the following months, and during September and October, 1918, there were 3,079 cases with 59 deaths. With regard to other diseases, preventive measures were successful in keeping the military population free from such diseases as Mediterranean and enteric fever, which are more or less endemic amongst the civil population, and in keeping the civil population free from diseases, such as dysentery, which were being brought to the hospitals from the theatres of war.*

The number of sick and wounded arriving in convoys up to February, 1919, was 2,538 officers, 14 nursing sisters, and 55,439 other ranks, or a total of 57,991 from the Mediterranean

* Lieut.-Colonel J. C. Robertson, I.M.S., acted as sanitary officer in the command until November, 1917. He was succeeded by Major G. R. Bruce, R.A.M.C. (S.R.)

Expeditionary Force, and 2,930 officers, 467 nursing sisters, and 74,733 other ranks, or a total of 78,130, from the Salonika Expeditionary Force. The highest number of patients in medical charge at any one time was 20,994 on the 23rd October, 1916. Of these, 403 officers and 13,068 other ranks were under hospital treatment and 103 officers and 7,420 other ranks in convalescent depôts, on light duty employments, or awaiting passage to return to their units.

The demobilization of the temporary hospitals in Malta at the end of the war was carried out as expeditiously and smoothly as their mobilization.

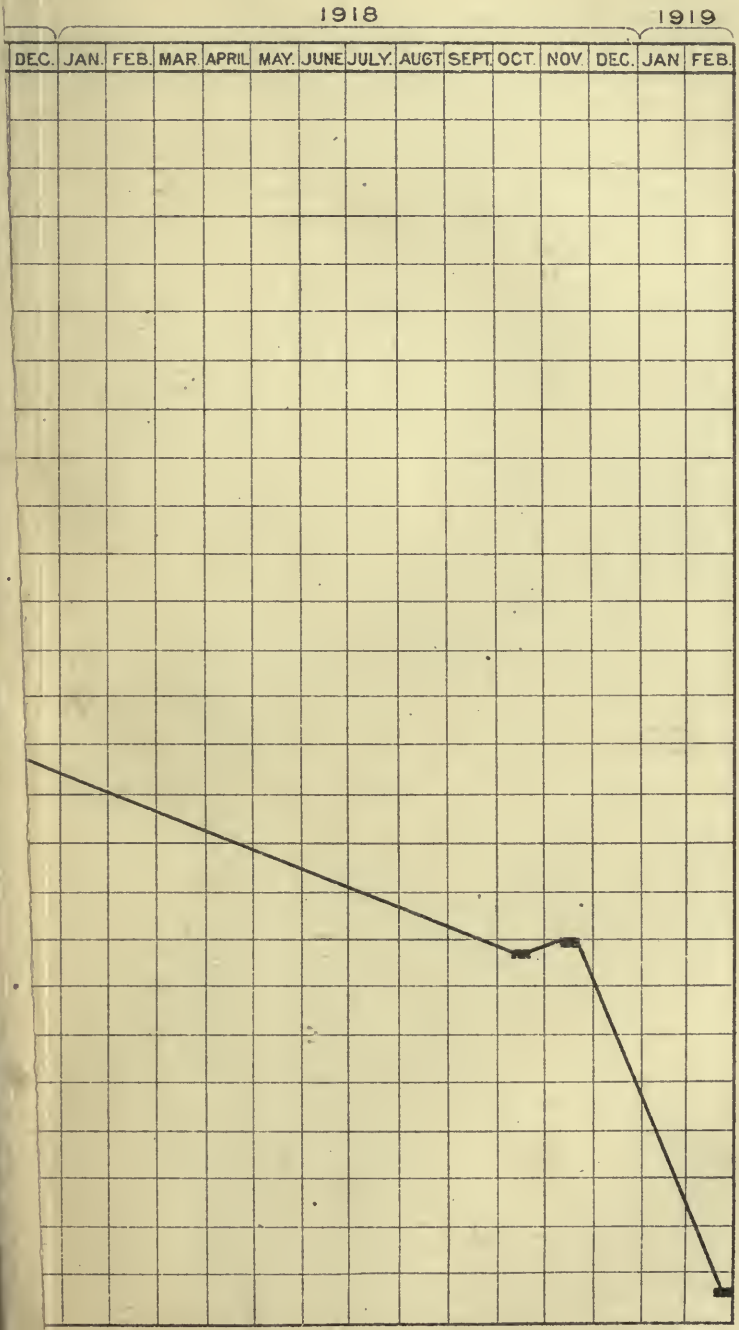
The following table shows the hospitals and convalescent depôts opened at Malta during the war, with the dates of opening and closing.

Designation.	Date of opening.	Number of beds on date of opening.	Maximum expansion.	Date of closing.
Cottonera ..	Pre-war	167	802	Post-war.
Imtarfa		55	1,853	
Forrest		20	186	
Valetta		36	524	
Tigné	2/5/15	600	1,314	6/1/19
St. George's ..	6/5/15	840	1,412	31/10/17
St. Andrew's ..	9/5/15	1,172	1,258	—
†Dragunara ..	14/5/15	12	20	29/8/17
Floriana	4/6/15	600	1,304	30/4/17
Blue Sisters ..	6/6/15	80	120	30/6/17
Hamrun	8/6/15	108	117	5/7/17
*All Saints ..	12/6/15	1,465	2,000	11/17
Bavière	15/6/15	105	155	14/8/17
St. Ignatius ..	2/7/15	155	196	?
Sisters Hospital, Floriana	10/7/15	12	31	?
St. David's ..	25/7/15	464	1,168	1/5/17
St. Elmo	12/8/15	218	348	10/17
St. Patrick's ..	15/8/15	1,000	1,168	27/4/17
*Ghain Tuffieha ..	15/8/15	2,000	5,000	1/19
St. Paul's ..	25/8/15	240	893	27/4/17
St. John's ..	1/9/15	400	520	9/10/17
*Fort Chambray ..	4/10/15	400	400	13/3/16
Spinola	6/11/15	1,000	1,168	27/4/17
Ricasoli	6/11/15	800	800	19/2/16
Manöel	16/11/15	500	1,184	21/12/18
†San Antonio ..	8/12/15	50	50	19/3/16
†Verdala	9/12/15	30	30	17/4/16
*Melleha	1/2/16	1,250	2,000	5/9/17

* Convalescent Depôts. † Convalescent Homes.

ɔM APRIL 1915 TO AUGUST 1917.

shaded portion indicates vacant beds. From
ds up to February 1919.



GIBRALTAR.

In Gibraltar the medical arrangements for defence were mobilized and in working order on the 4th August, 1914. The hospital accommodation consisted of 160 beds in the military hospital and this could be supplemented, if necessary, by equipping, as hospitals, barracks which had been vacated by the troops. The R.A.M.C. personnel was 13 officers, including the quartermaster, and 86 other ranks. There were nine members of the Q.A.I.M.N.S. Colonel J. Maher was in administrative medical charge of the command as D.D.M.S. Various dressing stations were prepared at points previously arranged in accordance with the defence scheme.

During 1914 conditions remained normal, but early in 1915 the less important dressing stations were closed, ready to be reopened, however, should it be necessary to do so; Colonel Maher was transferred to Egypt for duty, and Colonel H. H. Johnston took his place as D.D.M.S.

The medical work then, so far as the war was concerned, consisted in preparing accommodation for, receiving, and treating sick and wounded from the Dardanelles. When Gallipoli was evacuated, sick and wounded ceased to arrive in Gibraltar, so that from January, 1916, onwards the medical work differed very little from the work in peace time.

The maximum number of medical officers at any one time was 22, and of other ranks of the R.A.M.C. 180. The maximum number of the nursing staff, including Q.A.I.M.N.S., Q.A.I.M.N.S. Reserve, and members of voluntary aid detachments was 55.

Wounded first arrived in May, 1915, when seven Australians with very septic wounds were landed from the hospital ship "Letitia" on its way to England from Gallipoli.

The military hospital was then expanded and equipped for 300 beds, and buildings were selected at Europa to form an overflow hospital; but it was not till the following month that definite instructions were received from the War Office to provide accommodation for sick and wounded from the Dardanelles.

Permanent barracks and hutments at Europa flats, which provided 338 beds in addition to the 300 at the military hospital, were prepared, and in this way a general hospital of 638 beds, including 14 for officers in a temporary military families' hospital, was organized. These preparations were completed by the 2nd July, 1915, and the first convoy arrived on the 6th August in the hospital ship "Somali." Thirty officers and 210 other ranks were disembarked then.

Another convoy of 200 sick and wounded arrived in the "Asturias" on the 22nd August, and a third convoy of three officers and 28 other ranks in the hospital ship "Caledonia" on the 28th August. On the 30th August, 74 sick and wounded were transferred to the hospital ship "Ascania" for evacuation to the United Kingdom.

In order to keep beds vacant at the general hospital, a convalescent depôt was formed in August, 1915, at Windmill Hill. It had accommodation for 579 convalescents and was kept open till June, 1916.

Sick and wounded continued to arrive from the Dardanelles, and necessitated a still further increase of hospital accommodation. One hundred and sixty-two beds were obtained in September, 1915, in the Europa Pass Barracks and Windmill Hill flats, and 187 more in October, including 40 beds for officers in the Royal Artillery Mess at Bleak House, Europa. The maximum hospital accommodation in Gibraltar, amounting to 987 beds, was then reached. The hospital equipment was that of a stationary hospital, and at no time was it necessary to make use of tents.

Convoys continued to arrive until the end of 1915. Eleven officers and 376 other ranks arrived on the 8th October, 55 officers and 783 other ranks on the 15th October, 38 officers and 520 other ranks on the 8th November, and 690 other ranks on the 12th December. All these arrived in hospital ships with the exception of the convoy on the 15th October, which was landed from the ambulance transport "Caledonia." One hundred and thirteen of this convoy were sent direct to the convalescent depôt, and 200 were taken over by the Royal Naval Hospital. The majority of the cases were cases of dysentery, diarrhœa, and debility.

The convoy which arrived in December consisted chiefly of cases of frostbite.

When sick and wounded were sufficiently convalescent they were transferred by ambulance transport for passage to England, those who were fit for duty rejoining their depôt units.

The distance from the landing wharf to the hospital was about one mile and mainly uphill. The available ambulance vehicles consisted of six ambulance wagons, two ambulance carts, thirteen Ashford litters, and sixty rubber-tyred wheel stretcher carriers. There were no motor ambulance cars, but private motor cars and local vehicles were used for less severe cases. Stretcher parties were supplied by the infantry battalions.

In January, 1916, as convoys were no longer expected, the temporary hospitals at Europa and Windmill Hill were closed

and the beds reduced to 395. They were still further reduced to 241 in August of that year.

The only other event of interest affecting the medical services in Gibraltar during the war was the landing of 270 survivors of the hospital ship " Dover Castle," which had been torpedoed in the Mediterranean in May, 1917. They were brought to Gibraltar in the hospital ship " Karapara."

The health of the garrison was good, but the troops suffered, equally with the civil and naval population, from the epidemic of influenza in 1918, which commenced in Gibraltar in June and continued till December of that year.

CHAPTER XIV

THE MEDICAL SERVICES IN BERMUDA, JAMAICA, AND MAURITIUS

AS regards the West Indian Garrisons, the conditions differed only to a very small degree from the conditions which existed before the war; but regular R.A.M.C. personnel, as in the case of most of the garrisons abroad, were withdrawn for active operations elsewhere, and had to be replaced from local sources.

At no time during the war was there any hostile activity in or around the West Indian garrisons. Many changes, however, took place in the military forces and administration as a direct result of the war.

BERMUDA.

In Bermuda the garrison in 1914 had a strength of 1,274 officers and men, consisting of one battalion of British infantry, two companies of Garrison Artillery, one company of Royal Engineers, and details of the administrative services, including the 25th Company of the Royal Army Medical Corps. In addition to the regular troops there were two local Corps, the Bermuda Volunteer Rifle Corps, and the Bermuda Militia Garrison Artillery, the latter being composed of coloured troops.

The R.A.M.C. consisted of 7 officers and 25 other ranks. There were two specialist officers, one for surgery and the other for sanitation. There were three hospitals, a central hospital of 30 beds at Prospect, the command headquarters, a non-dieted hospital of 12 beds at St. George's, and a four-bedded non-dieted hospital at Boaz. The hospital at St. George's was, however, originally a large hospital and could accommodate 100 patients. There was an army medical stores at Watford near the naval dockyard, and a district laboratory near the central hospital at Prospect. A senior medical officer, with the rank of lieutenant-colonel, administered the military medical services.

From the point of view of safety from attack the central hospital at Prospect was well situated. The hospital at St. George's had the advantage of being situated near the water's edge, but was exposed to attack, and to reach it from the landing stage, to which wounded from outlying posts might

be brought, a steep hill had to be climbed. The mobilization scheme consequently provided for taking over as a hospital an establishment in St. George's known as Somers Inn. It was well situated for the reception of wounded from the landing stage, but had the inherent defects of narrow staircases and small rooms. Consequently, although it was actually taken over at the beginning of the war and equipped as a hospital, it was abandoned in less than a month and the original hospital at St. George's re-occupied.

In September, 1914, the battalion of British infantry was withdrawn and replaced by a battalion of the Royal Canadian Rifles, which in its turn was relieved in August, 1915, by the 38th Canadian battalion of the Canadian Expeditionary Force. In May, 1916, this battalion was replaced by the 163rd Canadian battalion, and it, in its turn, was relieved in November, 1916, by the second-line battalion of the 4th (T.F.) Battalion of the East Yorkshire Regiment. A battalion was sent also to Bermuda from Jamaica, the 3rd Battalion of the Jamaica War Contingent, and remained in Bermuda from the end of March till the 20th May, 1916. The Royal Garrison Artillery supplied drafts to artillery units in the theatres of war, and eventually the two companies were amalgamated into one.

With regard to the R.A.M.C. personnel, all the regular R.A.M.C. officers except one, Major Ahern, who took over the duties of senior medical officer, left during the war. The surgical specialist and one of the officers, who was on leave when war broke out, were withdrawn from the command at once, and the others in September, 1915. The Canadian battalion and the Jamaica battalion, however, arrived with their own medical officers, although two of the Canadian medical officers had eventually to return to Canada. Local civil medical practitioners were consequently employed and certain adjustments made in the distribution of medical personnel. The sanitary officer, until he was withdrawn for service elsewhere in September, 1915, was transferred, together with the laboratory, to Watford on Boaz Island. This move was opposed by the civil medical officer of health at the time, as it deprived him of the use of the military laboratory, which he had been privileged to use for his chemical and bacteriological examinations. Boaz Island, however, was in such an isolated position that no local civil practitioner could be sent there without separating him from his civil practice, and the sanitary officer's services were utilized there, not only for the laboratory work, but also for charge of the hospital and army medical stores. When he was withdrawn for active service in September, 1915, his duties were temporarily taken over by

the senior naval medical officer on Ireland Island. The distribution of medical personnel then was as follows: The senior medical officer, R.A.M.C., the medical officer of the Canadian battalion, and one civil surgeon* were on duty at headquarters and in the hospital at Prospect; two civil surgeons were employed at St. George's Hospital, and the senior naval medical officer, Ireland Island, acted as medical officer for the military garrison in Boaz Island and Ireland Island. In January, 1916, the medical officer of the Canadian battalion replaced the naval medical officer, and a second civilian practitioner was employed at Prospect.

This medical personnel was considered excessive by the financial authorities for a garrison of 1,773, but the scattered distribution of the troops, the difficulty of communication, and the fact that, in the event of casualties suddenly being thrown upon them, there were no means of transferring sick and wounded elsewhere, justified a somewhat large medical establishment.

This, in fact, occurred shortly afterwards, when in March, 1916, the 3rd battalion of the Jamaica War Contingent arrived on board the s.s. "Verdalla." The vessel was proceeding from the West Indies to Halifax with the battalion when it encountered a blizzard. The men, who were nearly all coloured and nearly all recruits, suffered so severely from the cold that the ship was ordered south to the warmer climate of Bermuda. On arrival there several hundred of the men in the battalion were found to be suffering from the effects of cold and frost-bite so severely that in ten cases amputations of toes or foot had to be performed, both feet having to be amputated in seven of the cases. The severe cases were admitted to the central hospital at Prospect. The St. George's Hospital was fully equipped and 87 of the cases sent there, while 19 more went to Watford hospital. The battalion was landed at Boaz Island and accommodated in tents and barracks, where 717 mild cases were treated as barrack hospital patients. There were also 38 cases of pneumonia, seven of whom died. The battalion had landed with a strength of 28 officers and 1,088 other ranks. Of these latter 199 were returned to Jamaica unfit for further service. The battalion finally proceeded to Halifax in May, 1916.

The influenza epidemic of 1918 attacked the troops in Bermuda in the middle of September, causing 484 admissions to hospital and nine deaths. The musketry camp at Warwick was opened as a convalescent depôt for them.

* Dr. W. E. Tucker, whose skill as a surgeon and untiring energy in all his work under the military authorities was specially praised by the Governor and Commander-in-Chief and by the senior medical officer.

The incidence of other diseases, with the exception of venereal diseases, was small. There were only six admissions for enteric, twelve for pyrexia of uncertain origin and one for dysentery, during the whole of the war period. Venereal disease caused 359 admissions, almost entirely amongst the men of the Canadian battalions.

With regard to sanitary work at Bermuda during the war, the outstanding feature was the completion in 1917 of a 1,000,000 gallon tank for supplying water to the barracks at Prospect.* At no time was there actual shortage of food in the islands; nor was it necessary to ration food supplies of the civil population.

JAMAICA.

The chief re-arrangement of medical services in the Jamaica garrison during the war was the concentration of all sick into the hospital at Up Park Camp and the closing of the hospitals at Port Royal and Newcastle. This arrangement was continued until the return of invalids of the British West Indian Regiment, when the Port Royal hospital was again opened. Except for the arrival of these invalids from time to time, the work in Jamaica varied but little from the routine work previous to the war; but the sick of troops from the United Kingdom likely to recover rapidly by change of air were invalided at once to England, instead of being retained in the island. The strength of the garrison was maintained by men of low military category and to some extent by West Indian troops. The Jamaica Artillery Militia was embodied on the outbreak of war.

The officers and most of the subordinate personnel of the R.A.M.C. were withdrawn. The former were replaced by civil practitioners and the latter partly by untrained men from home and partly by West Indians. The nursing duties were carried out by a staff of nurses trained locally.

A standing camp for prisoners of war was formed at Swallowfield, the sanitation and water supply of which were the same as for Up Park Camp. There was very little sickness amongst the prisoners while in Jamaica. They were removed to Halifax in the spring of 1915.

The sick and wounded of the Jamaica contingent and British West Indian Regiments, who were repatriated, had been many months in hospitals in France or elsewhere before returning to Jamaica. There was subsequently little left for the military medical services in the island to do with regard to them

* The source of water supply in Bermuda is rain-water, collected on roofs of buildings or from catchment areas.

beyond invaliding those who were unfit for further service, when they came under the care of the civil government and the district medical officers, with the right of treatment in the civil hospitals.

At no time during the war was there any difficulty in Jamaica in obtaining sufficient supplies of food and medical and surgical material.

MAURITIUS.

The garrison of Mauritius practically ceased to exist during the war, and all R.A.M.C. and Q.A.I.M.N.S. personnel, with the exception of two staff-sergeants and three privates, were withdrawn, and the military medical services for the small garrison of less than 100 British troops were carried out by a local civil medical practitioner. The military and families' hospitals at Curepipe, and the Indian hospital at Port Louis were closed, and the only hospital accommodation maintained during the war was ten beds which were equipped temporarily in one of the barrack huts at Vacoas, subsequently expanded in January, 1917, by the addition of ten more beds, in another of the huts, for venereal and infectious diseases.

During December, 1916, it was decided to mobilize a Mauritius Labour Corps for service in Mesopotamia, and a camp at Phoenix, adjoining Vacoas, which had been vacant for over a year, was taken into use as its depôt. On the 9th May, 1917, the Corps, consisting of nine officers and 954 other ranks, left for Mesopotamia, and was subsequently reinforced by drafts from the depôt. Officers and men belonging to it, who were invalided from Mesopotamia, returned to Mauritius in September and November, 1917, in February, May, and November, 1918, and in January and April, 1919. The first convoy consisted of one officer and 196 other ranks. The numbers subsequently arriving were small, the total, including the first convoy, being 226. After the Armistice in 1918 recruiting for the Corps ceased and all recruits then at the depôt were demobilized, leaving a few details for administrative purposes. There appears to have been comparatively little sickness amongst the recruits. A hospital for them was opened at first in the old hospital site at Phoenix Camp, but owing to the difficulty in obtaining medical personnel it was moved to a hut adjoining the hut used as a hospital for the European garrison in Vacoas, and placed under the supervision of the R.A.M.C. personnel there. It was equipped for 30 beds.

CHAPTER XV

THE MEDICAL SERVICES IN HONG KONG, THE STRAITS SETTLEMENTS, AND CEYLON

THE garrisons in the Eastern Colonies, Ceylon, the Straits Settlements, and Hong Kong were menaced by attack from the considerable German naval force in the China Seas on the outbreak of war, as well as by the land force, some 3,000 in all, which was garrisoning Tsingtau, although the chance of such attack was remote.

HONG KONG.

Hong Kong at the time war was declared had a garrison of some 6,090, consisting of three companies of Royal Garrison Artillery, one battalion of British infantry, four battalions of Indian infantry, an Indian Mountain Battery and Mule Corps Unit, together with details of R.E., A.S.C., R.A.M.C., and other administrative services.

In September, 1914, the battalion of British infantry was withdrawn and replaced in April, 1915, by a T.F. battalion of the King's Shropshire Light Infantry. Three of the Indian battalions and the mountain battery were withdrawn in the early months of 1915, and replaced by one Indian battalion only.

The R.A.M.C. establishment consisted of a Deputy Director of Medical Services, Colonel J. M. Irwin, in administrative charge, eight R.A.M.C. officers, including a quartermaster, four Indian Medical Service officers, one matron and seven other members of the Q.A.I.M.N.S., and a R.A.M.C. subordinate personnel. Most of these had been withdrawn by May, 1915. At that time the strength of the garrison had been reduced to about half its peace strength, while the physique of the British troops was on the whole of a lower standard than that of those in the garrison before the war, as the troops who had been withdrawn were replaced by men fitted for garrison duty only. The medical personnel then consisted of two R.A.M.C. officers, two Indian Medical Service officers, and one retired medical officer of the Royal Horse Guards, who happened to be in the Far East at the time and volunteered for duty. Only two of the nursing sisters remained.

The military hospitals on the island of Hong Kong and on

the mainland at Kowloon were not subjected to any great changes in consequence of the war, except in so far as they had to be administered by a greatly diminished staff of medical officers and nurses. The number of equipped hospital beds, however, was reduced in proportion to the reduction in the garrison. The Q.A.I.M.N.S. nurses were finally withdrawn in 1917, and replaced by civilian nurses till the end of the war. A women's voluntary aid detachment of the St. John Ambulance Brigade was formed in August, 1914, and trained in the military and civil hospitals. They were available for duty under the military authorities. Men's detachments were also formed at a later date and did duty with the Hong Kong Defence Corps.

The governing body of the "Matilda" Hospital, a civil institution on a beautiful site at the top of the Peak, placed its beds at the disposal of the military authorities for patients in need of convalescent treatment. Advantage was freely taken of this, especially during the hot months.

An ophthalmic specialist was appointed in 1917, Lieut. H. E. Murray, I.M.S.; spectacles being obtained locally. Dentistry was carried out by a local dental practitioner.

From the earliest days of the war a steady stream of men volunteered for active service, and special rooms were prepared for the medical examination of recruits at the military hospital. By the middle of June, 1918, 613 recruits were examined. In June, 1918, the Bill for Compulsory Military Service was passed in Hong Kong and all men called up were medically examined before going before the military service tribunal; 231 were thus examined in July, 1918, and 92 passed fit for service. This practically completed the recruiting work in the colony.

The defence of Hong Kong entailed holding numerous outposts by considerable forces, with whom the most rapid and in some cases the only means of personal communication was by water. Consequently as soon as these outposts were strongly held at the commencement of the war, a system of water convoys for the evacuation of the sick and their transfer to hospital was established. A special launch, provided with stretchers and medical equipment and comforts, was placed at the exclusive service of the medical authorities, and arrangements were made at the same time for medical officers or members of the Indian subordinate medical service to visit the outposts regularly and systematically. Special ambulance transport arrangements were also made for landing sick from the launch and conveying them to hospital.

After the fall of Tsingtau in 1914 and the cessation of any definite menace from the German navy, the strength of the

forces holding the outposts was somewhat reduced, but remained considerably greater than during peace. Consequently a number of R.A.M.C. orderlies was regularly maintained at the outposts throughout the whole period of the war, with a view to reducing to the lowest possible limits the constant transfer to hospital of men who were in need of only slight medical attention. This system proved so beneficial that it was continued as a permanent system after the war.

The sick and wounded from the troops engaged in the operations at Tsingtau were brought to Hong Kong and treated in the military hospitals at Hong Kong and Kowloon. They included 26 cases from the South Wales Borderers, and 15 from the 36th Sikhs. But in addition to these wounded, a certain number of men suffering from remote effects of wounds during the war came under the care of the R.A.M.C. in Hong Kong. These were men who had been wounded while with other expeditionary forces and had been subsequently transferred to Hong Kong as fit for garrison duty only.

A camp for interned civilians and prisoners of war was formed at the beginning of the war on Stonecutters' Island. The accommodation proved insufficient shortly afterwards and a larger camp was formed at Hunghom on the mainland, where about 300 were accommodated during the greater part of 1915; their families being interned in British married quarters at Gun Club Hill. The camp was visited daily by a medical officer. Sick requiring hospital treatment were admitted to the military hospital, and sick women and children were sent when necessary to the civil hospitals. In January, 1916, all interned civilians and prisoners of war, together with their families, were sent to Australia.

The general health of the Hong Kong garrison was remarkably good during the war. There was a severe outbreak of small-pox amongst the civil population in the winter of 1916-17; about 1,223 cases being recorded, with a mortality of 75 per cent. In twelve weeks 332,000 Chinese were vaccinated, the rush of those applying for vaccination being great. The only case amongst the troops was a mild case in an officer who was much exposed to infection in connection with some civil duties he was performing, and who was not well protected by vaccination.

In the early months of 1918 cerebro-spinal fever, which had been practically unknown in the colony, made its appearance; 1,235 civil cases were reported during the first six months, and in the spring of 1919 there was some recrudescence of the disease, but the troops remained entirely free.

Influenza, although always present to a considerable extent

in China, did not visit Hong Kong during the war in the form of an epidemic of any great severity.

There was never any scarcity of foodstuffs during the war, and no radical changes had to be made in respect of rationing and dieting in hospitals.

STRAITS SETTLEMENTS.

One British and one Indian battalion of infantry were stationed at Singapore on the outbreak of war, together with Garrison Artillery, Royal Engineers, and details of administrative services. On the 27th September, 1914, the British infantry battalion left for Europe, and was not replaced till the 23rd February, 1915, when the 4th (T.F.) Battalion of the King's Shropshire Light Infantry arrived from Rangoon, and remained in Singapore till April, 1917. The 25th Garrison Battalion of the Manchester Regiment had then just arrived from England and remained till July, 1918. It was replaced in August, 1918, by a wing of the 1st Garrison Battalion of the Manchester Regiment from India. The barracks at Tanglin were partly closed down and some of the duties were undertaken by local men of the Singapore Volunteer Corps. A camp had been formed in the grounds of the Tanglin Barracks for interned German civilians, and one of the duties of these volunteers was to guard the camp and the military hospital, which was kept open for the sick in the barracks.

The Indian battalion was quartered in the Alexandra Barracks and had its own regimental hospital and battalion medical officer there.

The British Garrison Artillery and Engineers were on the island of Blakan Mati, outside the harbour of Singapore and one of its sea defences. There was a military hospital on the island.

The R.A.M.C. personnel on the outbreak of war consisted of a senior medical officer, Lieut.-Colonel J. D. Ferguson, a command sanitary officer, two officers and thirteen other ranks at the hospital at Tanglin, and two officers and eight other ranks at the hospital at Blakan Mati. All of these officers were withdrawn for active service from time to time in other theatres of war ; the last to leave being Major W. F. Christie in February, 1916. Their duties were taken over by the officers and men of the Singapore Field Ambulance Company, a local volunteer unit, which mobilized immediately on the outbreak of war, and underwent a course of instruction in hospital duties and administration under the officers of the R.A.M.C. at the military hospitals. On completion of the course of instruction the

company was demobilized until subsequent events led to its mobilization in February, 1915, for field operations and to replace R.A.M.C. personnel in the garrison. One of its officers, Major W. R. C. Middleton, was appointed command sanitary officer in May, 1915, on the withdrawal of the R.A.M.C. sanitary specialist, and he became the senior medical officer of the command when Major Christie left in 1916. After that date the medical and sanitary work of the garrison was carried out entirely by the Singapore Field Ambulance Company. All the officers of the company carried out their civil as well as their military duties during that time. Major Middleton left for England in January, 1917, and was succeeded as senior medical officer by Major N. Black, also of the Singapore Field Ambulance Company, until the return of regular R.A.M.C. officers during June and July, 1919. Two of the medical officers of the Company were appointed to commissions in the R.A.M.C., one being posted to France, and the other employed in anti-gas work at the R.A.M. College in London.

The military hospitals in Singapore at the outbreak of war were the R.A.M.C. hospitals at Tanglin, Blakan Mati and Fort Canning, and the Indian regimental hospital in the Alexandra Barracks. The Tanglin hospital was equipped for 60 beds, which were increased to 170 on mobilization, and arrangements made for a still further increase if necessary by taking over an additional bungalow. Its establishment was reinforced by an officer and 12 men of the Singapore Field Ambulance Company. When the British infantry battalion left in September, 1914, the equipped beds were reduced to their original number and remained so till the end of the war.

The hospital at Blakan Mati was equipped for 40 beds, and continued to receive European sick until October, 1915, when it was closed, all European sick being transferred to the hospital at Tanglin.

The military hospital at Fort Canning was a small hospital for the Hong Kong Singapore Company of Garrison Artillery. It was definitely closed in February, 1915.

During the absence of a British infantry battalion from Singapore a mutiny occurred in the Indian battalion* quartered in the Alexandra barracks. It broke out with startling suddenness on the afternoon of the 15th February, 1915. Its effect on the medical services and the medical arrangements generally is described in a report by Major W. F. Christie, from which the following extracts are taken:

* Fifth Light Infantry. This battalion was afterwards transferred to the expeditionary force under General Dobell operating in the Cameroons.

" The mutineers seized the regimental ammunition, murdered some of their officers, and splitting up into parties each proceeded in different directions. To kill the white man and spare the white woman appeared to be the order of the day. The regiment possessed its own regimental hospital (Lieutenant Morrison, I.M.S., being in charge), but the hospital fell out of action as soon as the insurrection occurred. The hospital at Tanglin was under the command of Major A. J. Williamson, R.A.M.C., and a few R.A.M.C. N.C.O.'s and men. It survived the fate of the Alexandra Hospital by about an hour. A party of the Indians raided Tanglin, entering the hospital and driving the patients before them or killing them if they did not escape. They then shot and scattered the German prisoner guard, and promptly liberated the Germans. The hospital staff displayed great resource and bravery in attending to the wounded and in remaining within the vicinity of their post, but the hospital as a refuge for the wounded was not a safe place for quite a long time to come. On the outlying island of Blakan Mati, the small military hospital, which was beautifully placed on a high point of the island, was normally a centre for the treatment of malaria amongst the R.G.A. and the R.E. who manned the forts. In the town itself, for the military barracks were all on the outskirts, was the Government hospital for military officers and civilians, and much medical material could be drawn upon from that source if it was required. In such a surprise attack upon the community, heavy initial losses were inevitable. Many civilians encountered mutineers and were killed. The chief surgeon to the civil Government hospital fell an early victim. Soldiers returning to their posts of duty were seized and shot. Military headquarters established itself on the wharf belonging to the P. & O. Steamship Company. Here medical headquarters were to be found, Lieut.-Colonel J. D. Ferguson, R.A.M.C., being senior medical officer, and Captain A. N. Fraser, R.A.M.C., sanitary officer. The Blakan Mati military hospital was obviously a good place to send the wounded to on account of safety, and was promptly increased to a hundred beds. An excellent steam launch was made available for the conveyance of patients, and an ambulance wagon drawn by two bullocks plied between the Blakan Mati pier and the hospital. A medical aid post was established on the P. & O. wharf under Major Middleton, Singapore Volunteer Medical Corps, who superintended the embarkation. The very seriously wounded, unfit to stand the journey to Blakan Mati, were sent to the civil hospital in the town. Every available rifle was required to oppose the mutineers. The R.G.A.

and the R.E. left their sea defences, accompanied by Lieut. A. Legge, Singapore Volunteer Medical Corps. The naval ratings from a small naval sloop, H.M.S. "Cadmus," in the harbour, left their ship with their doctor, Surgeon-Lieutenant Ferguson, R.N. The Singapore Volunteer Corps marched out with Lieutenant Hunter and Captain R. Keith, S.V.M.C., and numerous offers of medical help were forthcoming from civilian practitioners. Desultory firing continued all that night, but the casualties were few. Lieutenant Legge, S.V.M.C., was mortally wounded and died in the civil hospital practically on admission. With daybreak commenced the attack on Alexandra Barracks where the mutineers had spent the night. The fighting was all with the ordinary service rifle. There was throughout no shelling, no hand grenades, no bayoneting. Some of the ammunition in the possession of the mutineers was practice ammunition and effects were less severe; but the range was short, especially when the British got in amongst the buildings of the barracks. The first batch of wounded arrived at Blakan Mati about 10 a.m. They stood the journey by boat and bullock ambulance cart well. Major A. J. Williamson, R.A.M.C., a surgical specialist, was sent to the hospital to superintend their surgical treatment. The larger proportion of the wounds were flesh wounds, and these healed up with great rapidity and seldom suppurated. The men generally were in good physical condition because the climate is such that regular exercise (tennis, football, swimming, cricket, etc.) is practised all the year round, Singapore having no seasonal variation. Some were malaria subjects, but few attacks of malaria were superimposed. There were no virulent infections, no gas gangrene, no tetanus, no septicæmia or pyæmia, and while the extensive wounds (particularly compound fractures) suppurated, the general infection was not severe. The recognized pre-war method of treating gunshot injuries was followed, antiseptic dressings, drainage, and splinting being employed. It is well known that suppurative conditions are extremely difficult to treat in a tropical country like Singapore, and several of these cases were evacuated to England as soon as possible. The only case which died after reaching Blakan Mati was one shot in the lumbar region of the spine and was hopeless from the first. After the British troops had driven the mutineers from their barracks and liberated some British officers and men who had been at bay all night in one of the bungalows there, fewer wounded arrived at the hospital. The strain amongst all ranks had been great, and the unfit began to fall out. Malaria and physical exhaustion combined were responsible for the

bulk of the sick. After the third day, the numbers of sick admitted outnumbered the wounded. With the addition of fresh British troops (4th K.S.L.I. and naval ratings) the mutineers scattered, and in the jungle chase which followed quite a number of men contracted malaria. The rounding up of mutineers lasted many weeks. As their forces weakened, so the mutineers threw away their rifles, and shooting except by the most desperate amongst them was abandoned."

During the mutiny and the subsequent field operations against the mutineers detachments of French, Russian and Japanese troops arrived in Singapore, as well as the British territorial force battalion from Rangoon. The hospital at Tanglin then became the base hospital for the reception of their sick and wounded, as well as for those of the Royal Navy and Marines, from amongst whom there were 603 admissions and seven deaths, including a death from wounds during the mutiny.

Ten of the volunteers defending the Tanglin barracks were killed and several wounded. Two of the interned German civilians were also accidentally wounded, one of them dying of his wounds. Three of the British regular troops were killed by multiple bullet wounds and several were wounded.

The sick of the interned Germans quartered in Tanglin barracks were treated in a small bungalow converted into a hospital. About 300 were interned from October, 1914, until they were removed to Australia in April, 1915.

After the mutiny was quelled the conditions as regards medical services resumed normal peace conditions, with the exception of the changes already noted in medical personnel and hospital accommodation.

The health of the garrison was good; a remarkable diminution occurring year by year during the war in the admissions for malaria, as a result of the anti-malarial measures which had been initiated before the war, continued throughout the war, and practically completed by the end of 1917. The admissions year by year for malaria are from this point of view instructive. They were 163 and 94 in 1912 and 1913 respectively. In 1914 they fell to 48, no doubt due to reduction in the British garrison, as in 1915 they rose to 87, when a new British battalion joined the garrison. But in 1916 and 1917 the admissions fell to 23 and 26, and in 1918 there were no admissions for malaria. Only 16 of the admissions in 1916 and 14 in 1917 were fresh cases, the others being re-admissions. Several of the cases of malaria were transferred to Ceylon for convalescent treatment.

The " Dilwara " arrived at Singapore in November, and the " Duneera " in December, 1918, from India with troops for Vladivostock. Both vessels had a large number of influenza cases on board, who were landed at Singapore. The slighter cases were treated in a bungalow converted into a hospital, and the more severe cases in the Tanglin Hospital. With this exception there was no special incident of importance affecting the health of the garrison.

CEYLON.

The chief feature connected with the medical services in Ceylon during the war was the arrival there of transports containing British, Indian, Australian, and New Zealand troops, whose sick and infectious cases were landed in the island and left in charge of the military medical officers. On the outbreak of war the R.A.M.C. personnel in Ceylon consisted of three officers and 23 other ranks. Two of the officers and eight other ranks left the command in October, 1914. The officers were replaced by two R.A.M.C. Special Reserve officers who were called up for duty. In January, 1916, the remaining R.A.M.C. regular officer was withdrawn and the strength reduced to one Special Reserve officer and three other ranks. The medical services were then reinforced by the Ceylon Medical Corps, which had opened a tented hospital for treatment of the personnel of the Ceylon Defence Force in a camp on the Rifle Green, Colombo, and which was eventually transferred to the military hospital, Colombo, where it continued to work till August, 1919.

A camp for prisoners of war was opened at Diyatalawa with one of the Special Reserve officers in medical charge. On the 15th November, 1914, eight British and 46 German casualties from the naval action between the " Sydney " and " Emden " were landed at Colombo, and transferred to the military hospital there. No deaths occurred and the cases were eventually discharged to duty or to the prisoners of war camp.

The subsequent medical history of the Ceylon Command during the war consisted mainly of dealing with cases of infectious diseases occurring on transports. Hæmorrhagic measles, cerebro-spinal meningitis, mumps, and influenza were the most frequent of these. In consequence of outbreaks of disease on board ship, troops had to be landed during the disinfection of the ship and its equipment. Five hundred to 800 men were landed for periods varying from two to fourteen days on several occasions, and at one time 2,000 troops were accommodated in camp for about fourteen days while the ship carrying them went into dock. In order to deal with their

sick a building was obtained on loan from the Colombo Municipal Council as a hospital and answered all requirements. Owing to this influx of naval and military patients from outside the Command the number of admissions to the military hospital in Colombo rose from 198 in 1915 to 980 in 1918.*

The troops belonging to the garrison were exceptionally free from disease, in spite of the fact that many of the European troops were kept for longer periods in Ceylon than their normal tour and an increase of neurasthenia of varying degrees was noticeable. Influenza visited the island during September and October, 1918, and although about two-thirds of the local troops of the Ceylon Light Infantry suffered very few cases occurred amongst the European troops. The senior medical officer notes that "the simple measures of daily sprinkling floors with cresol, and the use of a lysol gargle had a marked effect in checking the occurrence of the disease."

In 1917 and 1918 a large number of officers were sent to Ceylon on leave from Mesopotamia. Special arrangements were made for their treatment by the civil government medical officer at Nuwara Eliya.

In May, 1918, all the Europeans of military age, numbering 1,142, were examined for categorization as to their fitness for military service.

With regard to sanitary measures in the island, there appears to have been a certain amount of friction in the Diyatalawa area, owing to three sanitary interests, naval, military and civil, acting independently with different sanitary arrangements.

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* The following is a diary of the work thrown on the local military services from outside the garrison :—

"29/4/16—Forty-six cases of haemorrhagic measles *ex* Australian transport transferred to the military hospital.

"22/4/17—"Ingoma" landed 550 men who were camped on Rifle Green, "Yamen" landed 160 Chinese coolies.

"23/4/17—540 K.S.L.I. camped on Rifle Green, re-embarked on 6/5/17.

"13/7/17—"A.17" landed 750 troops owing to outbreak of cerebro-spinal meningitis. These camped on Rifle Green, and an infectious disease hospital was opened.

"24/7/17—"A.15" landed 280 patients. The officers' mess, Flagstaff, was opened as a hospital ; all embarked on 1/8/17.

"25/7/17—Forty-six Australian cerebro-spinal meningitis contacts were transferred to the military infectious disease hospital.

"7/8/17—"Empress of Britain" landed 70 British and 2,000 Indian troops, who were accommodated at Ragama till 17/8/17.

"6/12/17—An infectious disease hospital opened for mumps.

"25/9/18—31/10/18—Influenza epidemic : No. 5. Block Echelon barracks opened as hospital ; 136 patients under treatment.

"2/10/18—"Dilwara" landed 53 influenza patients.

"2/11/18.—"Duneera" landed 17 influenza patients.

"9/11/18—Eight hundred and thirty troops *ex* "Malta" landed and camped on Rifle Green, owing to outbreak of cerebro-spinal meningitis on board. The ship was disinfected and sailed on the 10/11/18."

An attempt was made to bring them under one sanitary control, but owing to lack of funds, it is said, the scheme was abandoned early in 1918. Invaluable assistance was obtained by the military medical authorities, however, from the civil authorities in the matter of disinfection, accommodation for infectious diseases, and specialist work when required.

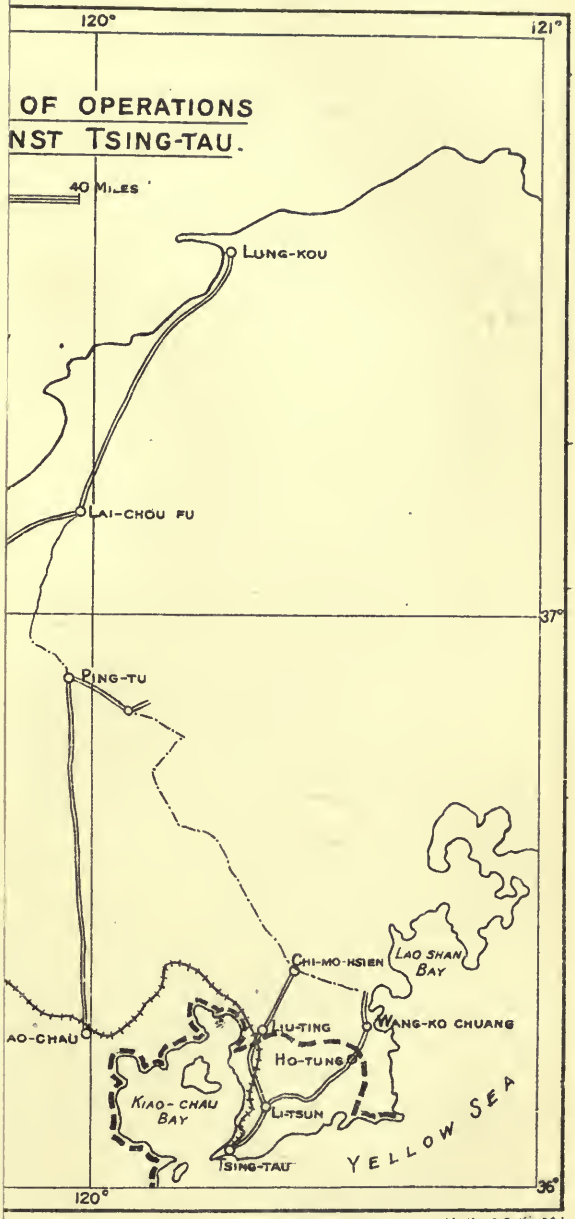
CHAPTER XVI

THE MEDICAL SERVICES DURING THE OPERATIONS AGAINST TSINGTAU

THE North China Command had its headquarters in Tientsin. The British garrison consisted of a battalion of British Infantry—the 2nd Battalion South Wales Borderers—an Indian battalion—the 36th Sikhs—and details of administrative services. It was commanded by Brigadier-General N. Barnardiston, his administrative medical officer at the time war was declared being Lieut.-Colonel C. J. Macdonald, R.A.M.C.

On the 15th August, 1914, the Japanese Government had sent an ultimatum to the German Government demanding the unconditional surrender of Tsingtau, and stating that, unless an answer to that effect was received by the 23rd August, military operations would be undertaken. When it was decided that a British force should co-operate with the Japanese, an expeditionary force was organized at Tientsin, consisting of the 2nd Battalion South Wales Borderers, with detachments of the Army Service Corps, Royal Army Medical Corps, Army Ordnance Corps, Army Pay Corps, and Army Veterinary Service. This force left Tientsin, under General Barnardiston's command, on the 19th September, 1914.

In the meantime a sea blockade of Tsingtau had been declared on the 27th August, 1914, and active operations on land had been commenced by the Japanese at the beginning of September. A large force of cavalry and infantry under Lieut.-General Kamio, composed chiefly of the 18th Division from Kyushu and supplemented by heavy artillery, landed on the 1st September at Lung-Kou, a small port on the north of the Shantung Peninsula at the southern entrance to the Gulf of Chili, opposite to and about 80 miles from Port Arthur. From there the force marched south to the German protected territory some 100 miles distant, through Lai-Chou-fu, Ping-tu, Chi-Mo-Hsien and Liu-ting, sending detachments west and south to Wei-Hsien and Kiao-Chau on the railway line between Tsingtau and Tsientin. The German sea and land protectorate, which extended radially from Tsingtau as a centre some 30 miles inland and seawards,


OF OPERATIONS
NST TSING-TAU.
40 MILES
LUNG-KOU
LAI-CHOU FU
PING-TU
CHI-MO-HSIEN
LAO SHAN BAY
AO-CHAU
LIU-TING
WANG-KO CHUANG
HO-TUNG
KIAO-CHAU BAY
LI-TSUN
TSING-TAU
YELLOW SEA
120°
121°
37°
36°
120°
Malby & Sons. Lith.

had a frontier along the western and northern shores of the Kiao-Chau Bay and across the neck of land from the north-east corner of the bay to the shores of the Yellow Sea.

The country enclosed by the land frontier was an area of precipitous and rugged mountains, intersected by rivers, valleys and nullahs on the east and north and more undulating country on the south and west. In its northern sector the Pai-sha-ho flows into the north-east corner of the Gulf of Kiao-Chau along the frontier line. In the middle sector the Li-tsun-ho and in the southern sector the Hai-po-ho also flow into the Gulf at distances of some 10 and 3 miles north of the town of Tsingtau respectively.

Tsingtau itself was an attractive modern settlement, the construction of which was commenced by the Germans seventeen years before the war. It had become a favourite summer resort of Europeans in the Far East, and was able to produce a garrison of some 150 officers and 3,600 other ranks for its defence, including the German garrison at Tientsin which was moved to Tsingtau on the outbreak of war. The water supply of Tsingtau was obtained from waterworks at Li-tsun, with subsidiary works near the mouth of the Hai-po-ho. When these were captured water could only be obtained from wells in the town area.

There were roads in the protected territory radiating in all directions from Li-tsun, a village in the centre of the area, but only two led across the frontier, one on the west to Liu-ting, and thence to various towns in Shantung and the other on the east, over the Ho-tung Pass to Wang-Ko-Chuang, on the Bay of Lao-Shan, and other places in the south of the Shantung Peninsula. Both these roads were connected up with Chi-Mo-Hsien, the principal Chinese town outside the frontier line, and about 10 miles distant from it. A road also ran along the railway line, which skirted the eastern shore of the Gulf of Kiao-Chau before turning westwards through Kiao-Chau. This road was also connected with Liu-ting and through it with Chi-Mo-Hsien. Many of the roads, however, were liable to become rivers of mud in wet weather, and were more of the nature of tracks than roads for heavy traffic.

The country west of the Chi-Mo-Hsien—Ping-tu road had suffered severely from recent floods, which had destroyed much of the railway line between Kiao-Chau and the frontier. With the exception, therefore, of a detachment of cavalry which proceeded to Kiao-Chau and from there patrolled the western shore of the Gulf, the Japanese main force marched against the Germans through the more hilly country from Ping-tu to Chi-Mo-Hsien, reaching the latter in the middle of September.

Liu-ting on the frontier was reached on the 18th September, and, having secured the frontier line, the Japanese then changed their base from Lung-Kou to Wang-Ko-Chuang on the Lao-Shan Bay, and sent a column from there to enter the German territory on the north-east corner of its frontier over the Ho-tung Pass, some 4 or 5 miles from Wang-Ko-Chuang. A field railway was then constructed along the Wang-Ko-Chuang—Chi-Mo-Hsien road and on to Liu-ting. It was subsequently extended as the Japanese advanced to Li-tsun.

General Barnardiston's small force arrived in Lao-Shan Bay on the 22nd September and landed at the Wang-Ko-Chuang base on the following day. It marched to Chi-Mo-Hsien, a distance of 13 miles, on the 26th September, being greatly delayed by the difficulty of movement along the single narrow road which was in bad condition and congested by traffic. At Chi-Mo-Hsien an advanced supply depôt was formed. On the 27th September the British force moved to Liu-ting, and on the 28th towards Li-tsun, bivouacking some 2½ miles behind the Japanese line. The weather was wet and the roads became tracks of deep mud.

During the first half of October the operations were against mobile German troops which were delaying the advance on Tsingtau, but by the middle of the month the enemy withdrew to a strongly fortified line extending from the mouth of the Hai-po-ho and southward across the Tsingtau promontory to the Yellow Sea.

During the latter half of October a line of investment was occupied. The enemy lines were finally assaulted during the first week of November, and the town capitulated on the 7th of the month.

The portion of the line assigned to the British troops was from Tashan along a line of some 600 yards eastwards. Two companies held the line at a time. The remainder of the force occupied shelters in nullahs at the village of Huang-Chia-Ying. On the 22nd October two double companies of the 36th Sikhs from Tientsin disembarked at Wang-Ko-Chuang and joined the British contingent in the line of investment.

In the final assault the advance was made to successive positions between the 1st and 6th November. On the 4th November heavy artillery fire was directed on the British, during which several casualties occurred amongst the ranks of the South Wales Borderers and the 36th Sikhs. In the advance to the final position on the 5th November, the 36th Sikhs had only slight losses, but the South Wales Borderers lost eight N.C.O.'s and men killed and 24 wounded.

AGAINST TSINGTAU.

MAN PROTECTORATE.

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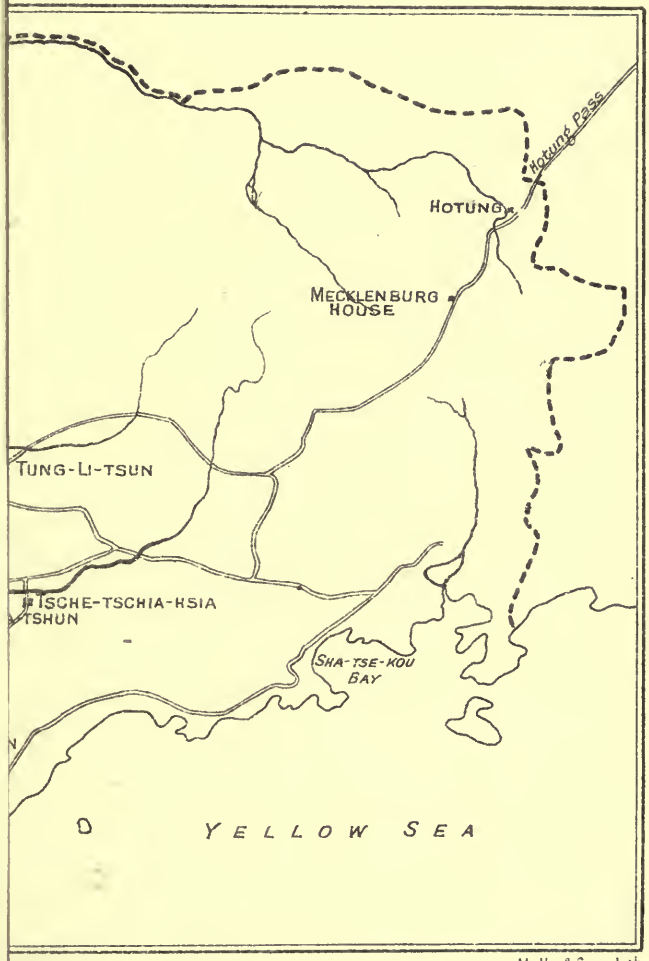


Malby & Sons, Lith.

The medical services of the British force were under the administrative control of Major J. A. Hartigan, R.A.M.C., who accompanied General Barnardiston from Tientsin. On the way to Lao-Shan Bay arrangements were made with the naval authorities at Wei-Hai-Wei to establish a hospital base there in the sick quarters of the Royal Navy.

The " Shenking " was also fitted out as a hospital ship at Wei-Hai-Wei by the Royal Navy for conveyance of sick and wounded to Wei-Hai-Wei.

The hospital at Wei-Wei-Wei was organized by Fleet-Surgeon Clerk, R.N., for 200 beds. It had a naval establishment, but when the 36th Sikhs joined the force, a sub-assistant surgeon of the Indian Subordinate Medical Department was obtained from Hong Kong and attached to the Naval Hospital, together with a havildar and four ward orderlies of the 36th Sikhs regimental medical service.

On arrival in Lao-Shan Bay, a small detention hospital was established at Wang-Ko-Chuang for the accommodation of sick and wounded sent from the front while awaiting embarkation on the hospital ship. It had three large marquees and maintained a supply of medical stores and comforts. Its personnel consisted of a civil surgeon* from Tientsin, one N.C.O. and one private of the R.A.M.C. It was originally intended that the civil surgeon should accompany convoys of sick and wounded on the " Shenking " when necessary. The voyage to Wei-Hai-Wei was some 200 miles, and the medical staff appointed to the hospital ship was one N.C.O. and one private of the R.A.M.C., but the ship's officers and staff, two Chinese cooks and fifteen Chinese servants assisted in the care of the patients. The " Shenking," however, only made one voyage, for soon after the British contingent had commenced operations a hospital carrier, " Delta," which subsequently became a hospital ship for duty in other theatres of war, arrived with a large staff of medical officers, nursing sisters, and male sick attendants. The " Delta " made three voyages with sick and wounded.

The medical arrangements with the field force consisted of a regimental medical service and a composite field medical unit, organized from personnel and material available at Tientsin. For regimental medical duties an officer of the R.A.M.C., Captain G. H. Dive, was attached to the South Wales Borderers, and a regimental medical establishment consisting of an Indian Medical Service officer, Captain E. S. Goss,

* Dr. L. D. Shaw, afterwards temporary Lieut.-Colonel Shaw, R.A.M.C.

four Sikh ward orderlies and four Indian dhoolie bearers accompanied the detachment of the 36th Sikhs.

The field medical unit was organized as a modified field ambulance with bearer and tent sections. Its equipment, personnel and transport had to depend upon the resources obtainable in Tientsin. The tent section had six 160 lb. tents, ten camp beds and ten palliasses, with medical and surgical material, and a personnel of two officers, Major J. A. Hartigan and Captain A. E. B. Wood, and twelve other ranks R.A.M.C. The bearer section was formed of 55 Chinese coolies, engaged and specially trained for the purpose at Tientsin, with nine dandies and a reserve of eight field stretchers. The transport consisted of three ambulance tongas, six transport carts and one water-cart.

The unit accompanied the force on its march to Li-tsun and at first opened at the village of Yang-Chia-Chuang about 3 miles farther south. The camp, however, came under the enemy's artillery fire and the ambulance was withdrawn to Tsche-Tschia-hsia (Chi-chia-hsia), some 5 miles farther east, and out of the line of fire. It remained there till the capitulation of Tsingtau. Its accommodation during that time was increased, as opportunities occurred, to 28 hospital beds and 60 palliasses. It became, in fact, the one British medical unit for treatment of sick and wounded. The situation was suitable and pleasant, sufficiently close to the troops in the field, and on the direct route from front to base. During the final operations it was sufficiently well equipped to provide a hospital bed for every case of any severity admitted to it.

In arranging for the removal of sick and wounded from the front two main points had to be considered. Owing to the condition of the roads for about one mile from the outposts, dandies and carts could not be used. Consequently all wounded had to be removed on stretchers over that distance, and as the first part of the journey was exposed to the enemy's fire, and as, therefore, it might not always be advisable to send a patient back at once, it was necessary to make arrangements for the temporary accommodation of patients at the outposts. Consequently a large combined regimental aid post was formed of splinter-proof shelters in the nullahs at Huang-Chia-Ying capable of accommodating 40 to 45 cases lying down. The medical officers with the British and Indian battalions, and one N.C.O. and one cook of the R.A.M.C., with a supply of medical and surgical material and comforts, were posted to it. For the transport of wounded from the outposts to the regimental aid post there were available twelve regimental

stretcher squads and eight Chinese stretcher squads who carried the cases to an advanced dressing station.

The latter was formed about a mile in rear of the regimental aid post. It had splinter-proof shelter for 30 men and was at the most advanced point to which wheeled transport could be taken with comparative safety. Its personnel consisted of one medical officer, one N.C.O. and two men R.A.M.C., with nine dandies and, when required, three tongas and eight carts. More of the latter were available if necessary.

From the advanced dressing station to the field medical unit or main dressing station the more serious cases were carried in dandies, all other lying-down cases in carts and sitting-up cases in tongas.

The arrangements worked very well, there was no delay in the journey, and even on the day when there was a large number of casualties it allowed ample time to get the wounds dressed and every patient cleansed and put comfortably to bed before dark.

As the available ambulance transport was very limited, experiments had been made in Tientsin, previous to the departure of the expedition, to determine how far the Indian pattern transport cart could be used for the carriage of wounded. The bottom and sides were well padded with straw and covered with blankets or a tarpaulin. The width of the carts was not sufficient to carry two patients on stretchers, but was just sufficient for them on blankets, the rails on the side of the cart preventing lateral jolting. Patients were lifted on and off the carts on blankets without distress.

The transport of sick and wounded from the main dressing station to Lao-Shan at first presented a somewhat difficult problem. It was not possible or desirable to send them by the ordinary line of communication which was through Liu-Ting and Chi-Mo-Hsien, as the journey would have taken three days and there were no hospitals on that line other than Japanese. Endeavours were made to have the hospital ship moved to Sha-Tzu-Kou Bay, 12 miles nearer, but this was not considered safe until the end of the operations, owing to mines. All patients had, therefore, to be sent by the Ho-tung Pass and, as the latter was not suitable for wheeled transport, dandies had to be used. The journey was a long one, 18 miles, but all the patients stood the journey well and suffered no ill-effects. A R.A.M.C. cook was always sent on ahead as far as "Mecklenburg House," a German sanatorium on the road to Ho-tung, to prepare tea and bovril for the patients there. To ensure that no unnecessary delay would occur on the journey, eight coolies were sent with each dandy,

and nine if the patient was above average weight. These extra coolies were obtained locally and paid in Japanese war notes.

All sick convoys to the base were accompanied by a medical officer and a nursing orderly.

The general health of the troops was very good. The admissions to hospital for sickness were 156; 99 were discharged to duty, 56 were transferred to the hospital ship, and one died in hospital.

The three most prevalent diseases were malaria (29 cases), catarrhal enteritis (21 cases), and inflammation connective tissue of hands (7 cases). Of the 29 cases of malaria, 23 occurred during the first month of the campaign. All the cases had a history of previous attacks in North China. Each man who suffered from the disease was kept under observation and given quinine for three weeks after discharge from hospital. Some of the cases of enteritis were of a severe nature and required prolonged treatment in hospital. With the exception of two cases that were transferred to the hospital ship, all returned to duty. Major Hartigan attributed the attacks to the unusually cold and wet weather during the latter half of the campaign, and to a large amount of insoluble matter suspended in the water at the time. The cases of inflammation connective tissue of hands were all of a severe nature and were the result of blisters obtained during entrenching work. One man died in hospital from dysentery during the operations. The case was a very severe one from the beginning. One other case of the disease occurred about the same time. This was also of a severe nature and was followed by liver abscess. The patient was operated on and did well. He was transferred to the hospital carrier " Delta."

The total battle casualties during the campaign were 12 killed and 59 wounded, distributed as follows :—

	Killed.		Wounded.	
	Officers.	O.R.	Officers.	O.R.
2nd South Wales Borderers	—	10	2	38
36th Sikhs	—	2	3	14
Australian Intelligence Corps	—	—	1	—
Army Service Corps ..	—	—	—	1

Most of the wounds were caused either by shrapnel or shell fragments. Some were of an unusually severe nature, but in no case did gas gangrene intervene. Five operations were performed at the main dressing station : extraction of bullets (3), excision of glands (1), liver abscess (1).

In addition to the above one circular amputation at the middle of arm was performed. The patient was an old Chinese woman aged 61 years. Her hand and wrist were blown off by a shell three days previously and gangrene had set in when she came to hospital. The wound healed by primary union and she returned to her home twelve days afterwards.

Owing to the nature of the operations and the limited space at the disposal of the troops, satisfactory sanitary arrangements were often difficult to maintain. In almost all cases water was obtained from rivers or streams, which were specially liable to pollution from the large number of troops in the neighbourhood. After rain the water contained a large amount of sand which, as already mentioned, was a probable cause of diarrhoea. There was, however, an entire absence of enteric or other allied fevers. A large proportion of the troops had been inoculated against enteric fever. Very good water discipline was maintained and tea was prepared for the men to carry in their water-bottles. Two portable Griffiths' water sterilizers were sent with the expeditionary force and provided a sufficient supply of sterilized water at all times. Though the use of these sterilizers was not practicable on the line of march, they were of the greatest value in the siege operations. No filter water-carts were available.

The rations issued were excellent both in quantity and quality.

Major Hartigan makes special mention of the unvarying kindness shown by the Japanese medical authorities, who on every available opportunity were ready to afford medical assistance to the British troops. Lieut.-Colonel Iishima, the director of medical services of the Japanese Forces, was in close touch with him, and Major Hartigan's responsibilities were greatly lessened by the knowledge that Japanese medical assistance was always available if required, although it was never necessary to apply for it.

Lieut.-Colonel Iishima also gave Major Hartigan the following interesting statement of the Japanese casualties during the operations :—

Sickness.

	Officers.		N.C.O.'s & Men.		Total.	
	Admissions.	Deaths.	Admissions.	Deaths,	Admissions.	Deaths.
Infectious diseases ..	1	—	34	2	35	2
Other diseases.. ..	26	1	7,221	25	7,247	26

The numbers shown under admissions do not include those cases which ended fatally.

The infectious diseases were as follows: typhus fever (4), dysentery (33).

Battle Casualties.

Officers.		N.C.O's and Men.		Total.	
Killed.	Wounded.	Killed.	Wounded.	Killed.	Wounded.
15	43	427	1,423	442	1,466

Killed (442).

Classification according to projectile: Shell wounds, 220; bullet wounds, 178; wounds from mine explosions, 8; other causes, 36.

Classification according to seat of injury: Head, 142; face, 20; neck, 23; chest, 135; abdomen, 63; upper extremity, 7; lower extremity, 38; unknown, 14.

Wounded (1,466).

Classification according to projectile: Shell, 871; bullet, 508; mine explosions, 31; bayonet, 20; other causes, 36.

Classification according to seat of injury: Head, 154; face, 198; neck, 23; chest, 128; abdomen, 80; upper extremity, 430; lower extremity, 449; unknown, 4.

CHAPTER XVII

THE MEDICAL SERVICES IN WEST AFRICA AND DURING OPERATIONS IN TOGOLAND

SIERRA LEONE

SIERRA LEONE was the only station in the West African Colonies garrisoned by Imperial troops at the time war commenced. During the war period certain local changes were made in the hospital accommodation and medical personnel, but otherwise the medical services were chiefly concerned in mobilizing and equipping units for the Cameroon Expeditionary Force, and subsequently in important medical work connected with the concentration and embarkation of native carriers for the campaign in East Africa. Lieut.-Colonel Gerrard, R.A.M.C., was the senior medical officer. Two of the R.A.M.C. officers, Major Statham and Captain E. B. Booth, accompanied the expeditionary force to the Cameroons, the former as director of medical services of the force. The advent of the convoy system in 1916, with its concentration of naval vessels and transports, kept one officer of the R.A.M.C. busily employed as embarkation medical officer at Sierra Leone for the removal of sick from transports to hospitals, inspecting vessels, and supplying medical stores.

Approximately 12,000 carriers for the expeditionary force in East Africa were concentrated at one time or another at Sierra Leone during this period of the war, and came under the charge of the medical staff. Infectious diseases from transports were fairly numerous. On one occasion 14 cases of cerebro-spinal meningitis and 850 contacts were landed, and a serious epidemic of influenza broke out in August, 1918.

The military hospitals at Sierra Leone before the war period were at Wilberforce, Tower Hill, and Mount Aureol. The Wilberforce hospital was not suitable for occupation when war commenced, as it was in the fire zone of the defences; and was consequently taken over for non-medical purposes. A hospital for the West African Regiment was provided in its place in barracks. The Tower Hill and Mount Aureol hospitals were capable of expansion to 150 beds by using verandahs, and the Garrison Club near the former could accommodate 30 more

if necessary. The barrack rooms at Tower Hill and Mount Aureol were also available for treatment of slighter cases fo sickness or injury, and auxiliary accommodation was to be found in civil hospitals.

The medical personnel was always maintained at a strength of eight officers by appointing for duty on shore medical officers from transports from time to time to replace those on the sick list. The strength of orderlies was also maintained during periods of stress by obtaining assistance from transports. Much voluntary help was given by ladies of the garrison, three of whom had nursing qualifications.

There were no specialist officers, but much organized sanitary work was carried out by forming sanitary areas with a medical officer and a bush-clearing gang of some 20 men in each, under the direct control of the senior medical officer. Malaria was the chief disease with which they had to contend, and not only were active measures taken to free the military area from mosquitoes, but the civil sanitary officer arranged for an inspector and two sanitary squads to clean up the neighbouring villages. Subsequently, in August, 1915, they were placed under military control.

In 1917 the harbour throughout the year was usually crowded with warships, transports and other vessels. Numbers of soldiers and sailors from these were allowed to come on shore and contracted malaria. In February, 1918, a meeting of naval and military medical officers was held to consider the question of preventing this, and it was decided to appoint a naval medical officer to inspect all ships, other than transports, entering the harbour, to restrict shore leave, and to prohibit any persons from the ships remaining on shore after 6 p.m. Also a civil anti-malarial commission was appointed in 1918, and an anti-malarial scheme for the civil population and the town of Freetown was authorized. The importance of anti-malarial measures is emphasized by the large number of malaria cases which occurred in a small garrison of an average strength of some 300 during the war. 2,437 admissions with nine deaths were recorded during the whole period of the war. In fact, two-thirds of the total sickness in the garrison was caused by it.

The influenza epidemic in August and September, 1918, caused 135 admissions with 4 deaths amongst the European troops, and 1,171 admissions with 32 deaths amongst the West Africans in a very short period of prevalence; 319 cases and 26 deaths also occurred amongst cases landed from ships of the Royal Navy. Five barrack rooms at Mount Aureol with accommodation for 150 beds were allotted for their reception and a naval medical officer with 14 naval ratings placed in

charge. At the time of the epidemic there was some difficulty in obtaining suitable articles of food such as eggs, chickens, and fruit; but this was alleviated by Red Cross comforts and stores which were obtained by an appeal to some Australian transports then in harbour. An issue of rum and of ½ lb. fresh meat is said to have been beneficial, especially in the case of the native troops, in counteracting the effects of the epidemic.

OPERATIONS IN TOGOLAND.

An expeditionary force operated against the German colony of Togoland between the 7th and the 26th August, 1914. On the 12th and 13th August a base was formed at Lomé, which had been evacuated by the Germans immediately after war was declared. The British force operating from this base was organized in the adjoining Gold Coast colony and consisted of 16 European officers, 7 European non-commissioned officers, and 535 rank and file of the Gold Coast Regiment, with 2,000 native carriers. It was joined on the 18th August by a detachment of French Senegalese troops composed of 3 European officers, 5 European non-commissioned officers, 150 native rank and file, and about 100 carriers. This Lomé force was under the command of Lieut.-Colonel Bryant. A second British column operated from Krachi on the western frontier of Togoland, and a second French column under Major Maroix marched on Atakpame (Kamina) from Dahomey, while a third French column entered Togoland from the North.

The force from Lomé advanced on the 14th August, one company of the Gold Coast Regiment moving to Tsewie, and the remainder of the force to Togblekove. It came into touch with the enemy at the Lili river on the 14th and 15th August, and engaged in severe fighting at Agbalohoe, which fell into the hands of the British and gave them possession of the railway line for 30 miles farther north.

After the French detachment had arrived the whole force was concentrated on the 20th August at Nuatja, and on the 22nd August attacked a strongly entrenched position at the Chra river. The enemy force opposing Colonel Bryant's column was estimated at 60 Europeans and 400 native soldiers. Owing to their strongly entrenched position the casualties amongst them are said to have been few, but the British lost 2 officers and 21 men killed and 2 officers and 48 men wounded, or 17 per cent. of the force engaged. The enemy withdrew from the Chra position without further fighting and surrendered unconditionally on the 26th August. Major Maroix's column reached Atakpame on the 27th August. By that time the other

columns operating against Togoland had not come in touch with the main column from Lomé.

The British medical arrangements were organized entirely by the medical service of the Gold Coast Colony. Dr. W. W. Claridge, who accompanied the Gold Coast Regiment from Kumasi, was appointed senior medical officer of the force. He had with him a dispenser and a dresser. Another medical officer, Dr. Mugliston, came with the regiment from Obuasi, Dr. Condy and a sanitary inspector joined from Accra. Two other medical officers, Dr. d'Amico and Dr. May, were also attached to the force, and another medical officer, Dr. G. H. Le Fanu, was in Lomé in advance of it, on the 7th of August. On the 18th August the deputy principal medical officer of the Gold Coast Colony, Dr. E. H. Tweedy, with one other medical officer, Dr. J. M. O'Brien, three dispensers and three dressers arrived at Lomé from Accra, and took charge of the base there. One medical officer, Dr. W. Watt, and a dresser were with the Krachi column.

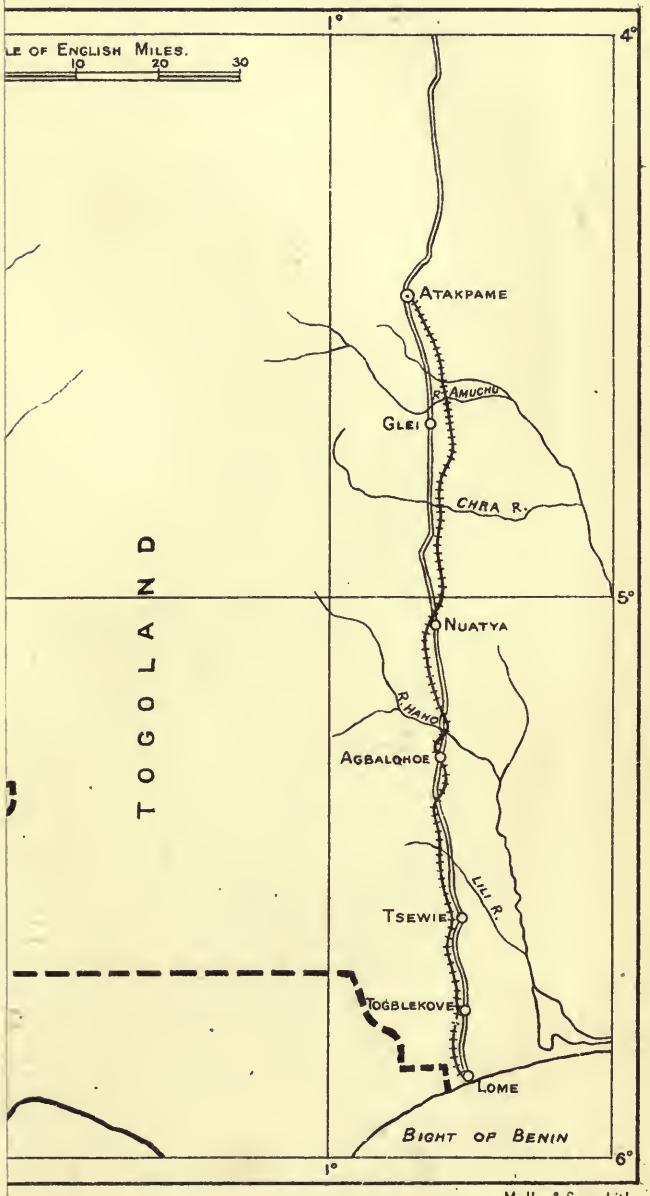
A good German hospital existed at Lomé and was taken over by Dr. Le Fanu when the Germans left. It was being reconstructed and the partially finished new buildings were rapidly prepared. The old buildings contained 7 beds for Europeans and 20 for natives, the new buildings 14 for Europeans and 40 for natives, so that there were altogether 27 European and 54 native beds available. Four German nursing sisters and 27 others of the staff had been left behind and were retained for work in the hospital under Dr. Le Fanu. Two other sisters were subsequently added to the staff.

The total number of sick and wounded admitted to the Lomé hospital during this short campaign was 13 Europeans and 53 natives, of whom 18 were French Senegalese. The number of admissions for wounds was 6 Europeans and 45 natives. Only one wounded case proved fatal, although the Germans had used soft-nosed and sporting ammunition, which caused wounds of a very severe character.

The general health of the force was excellent, the admissions for sickness being for mild attacks of malaria, rheumatism, catarrhs, and blistered feet.

The climate and general character of the country over which the operations took place were more favourable than during the subsequent operations in the Cameroons. The coastal region is comparatively dry with a mean annual rainfall of 27·56 in., while the rainfall in the interior is considerably higher, thus reversing the meteorological conditions which obtain in the Cameroons. August is a dry month in the coastal belt, but wet in the interior, the mean annual rainfall at Lomé

ERATIONS AGAINST TOGOLAND.
AUGUST 1914.



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during August being only 0·08 in., as compared with 7·01 in. in Atakpame. The line of advance from Lomé to Atakpame passed through a belt of oil palms and forest for the first 30 miles or so from Lomé ; from there onwards it was more or less open bush country to Atakpame, which was at an elevation of 1,080 ft. above sea-level.

The sanitary conditions at Lomé and elsewhere were bad. There were no latrines, and it was only after energetic sanitary work that improvements were effected. Pit latrines were dug and refuse burned, but, at Lomé, in the absence of latrines the men were marched at intervals to the sea.

Temporary hospitals were formed at camps on the lines of communication, and evacuation of wounded from the Chra battle was effected comfortably and rapidly by means of an ambulance train, which was organized at the base and arrived at the Chra two days after the action. It had been fitted out with great rapidity both for lying-down and sitting-up cases, the Catholic mission at Lomé helping greatly in equipping it. For the prisoners of war a detention hospital was prepared on a ship, and a German medical officer, Dr. Berger, placed in medical charge of it.

The Gold Coast Regiment subsequently joined General Dobell's force for operations in the Cameroons.

CHAPTER XVIII

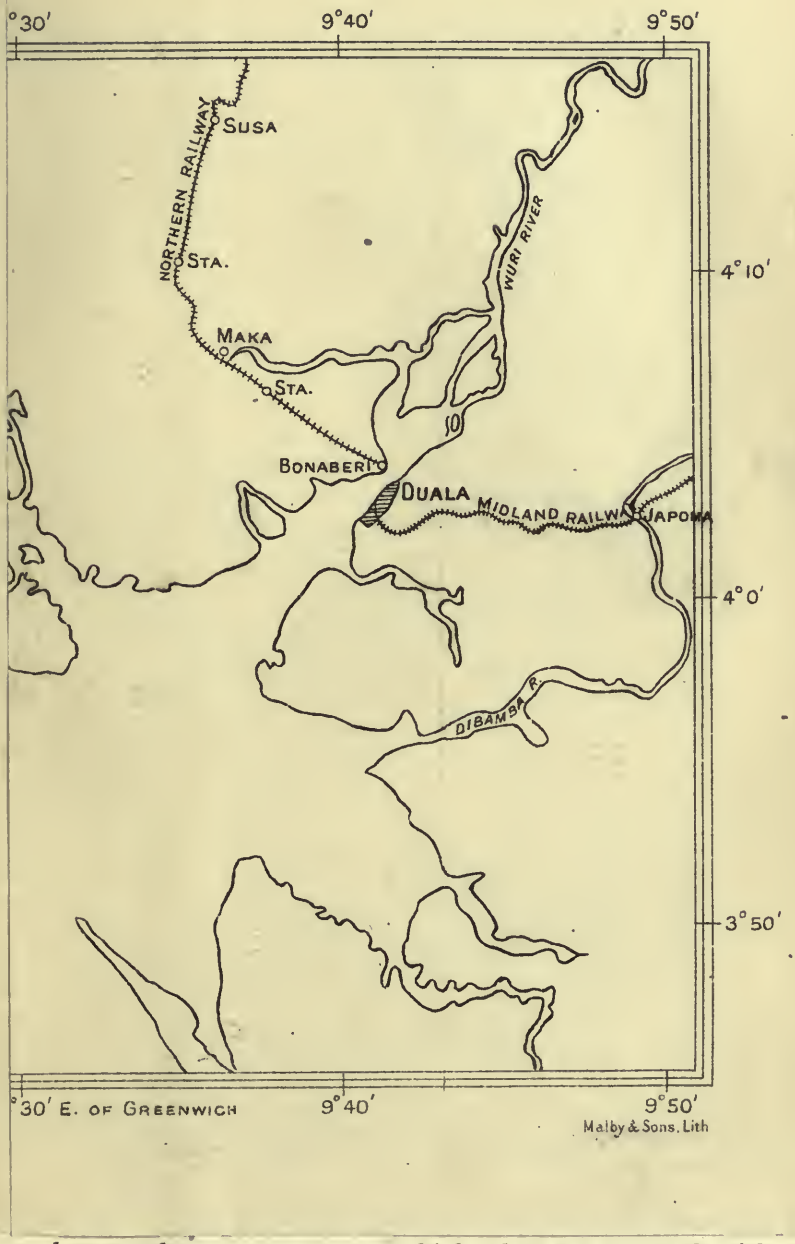
THE MEDICAL SERVICES DURING THE OPERATIONS IN THE CAMEROONS

THE formation of an expeditionary force against the Cameroons consisting of British and French troops under the command of Brigadier-General C. M. Dobell, the Inspector-General of the West African Frontier Force, was decided upon in August, 1914. Before its arrival, French columns from French Equatorial Africa had already attacked the German posts on the north-east and south of the Cameroons, while small British columns attacked posts on the Nigerian frontier at Mora, Garua, and Nsanakang. The British attacks were repulsed with a loss of about 150 officers and other ranks. These operations were followed on the 6th September by a strong German attack on a British detachment which had succeeded in occupying Nsanakang on the south-west corner of Nigeria. The British troops there lost 7 officers and 180 other ranks in killed, wounded, or captured, and were practically annihilated.

General Dobell left England on the 31st August, with a small staff on the "Appam," a ship of 8,000 tons, and picked up troops, carriers, and stores at various ports on the coast of West Africa: 20 men at Gambia, 800 troops and 1,300 carriers at Sierra Leone, 1,200 carriers at Accra on the Gold Coast, and at Lomé 600 men of the troops which had already captured Togoland from the enemy. At Lagos, European volunteers were embarked and given commissions. Major Best, R.A.M.C., Special Reserve, who was an officer of the West African Medical Staff, and Principal Medical Officer, Southern Provinces, Nigeria, also joined the force at Lagos. Farther south, at Forcados and Calabar, two battalions of the Nigeria Regiment, W.A.F.F., and 1,500 carriers were added. This completed the British force. A French force of 2,267, including 54 European officers and 354 European other ranks, together with 1,000 carriers, under Colonel Mayer, sailed from Dakar to Sierra Leone and joined General Dobell's expeditionary force there.

This allied force mustered in Cameroon Bay on the 23rd September, 1914, in about 20 ships. It consisted then of 154 British officers, 81 British non-commissioned officers, and

2,460 British West African troops, 2,267 French, and 4,563



northern and eastern areas are high plateaux covered with

154 British officers, 81 British non-commissioned officers, and

2,460 British West African troops, 2,267 French, and 4,563 carriers, in addition to some 2,500 ratings of the British and French navies. The objective was Duala, the commercial capital of the Cameroons, which lay 17 miles up the river from Cameroon Bay.

Operations were commenced on the 26th September, 1914, and by means of a bombardment carried out by H.M.S. " Challenger," which had forced its way through sunken wrecks and other obstacles to within 11,000 yards of the town, Duala surrendered on the 27th September, and became the base of the operations which General Dobell's force subsequently conducted in various directions until the capture of Jaundé, the new seat of the German Government in the interior, on the 1st January, 1916.

In addition to the operations of the main expeditionary force based on Duala, operations were also conducted by British and French columns based on posts in Nigeria and in French Equatorial Africa. A northern force of 3,250 British and 750 French, under Brig.-General Cunliffe, advanced from Maidugari, Yola, and Ibi in Northern Nigeria, and Fort Lamy in French Equatorial Africa ; another column known as the Cross River Column entered the Cameroons from Ikom in Southern Nigeria ; while French columns composed of 3,270 French and Belgian troops, afterwards increased to 4,000, under General Aymerich, entered the Cameroons from east and south. All these columns converged on Jaundé with General Dobell's main or western force in January, 1916. After the occupation of Jaundé the Germans dispersed southwards towards the Spanish territory of Muni, and subsequent operations consisted of columns of British and French endeavouring to intercept them. By the middle of February, 1916, all the German forces had surrendered or been driven into the neutral territory and the conquest of the Cameroons was complete.

The country over which the operations took place was of vast extent, covering some 306,000 square miles,with a greatest length of 800 miles and a greatest width of 600 miles. The coastal belt through which the Western force and to some extent the Cross River Column operated consisted of dense forest and tropical vegetation. Beyond the coastal belt to the north and centre of the Cameroons the country is open, grassy, or mountainous. The Cameroon Mountain rises abruptly from the sea to over 13,000 ft. in height a short distance north-west of Duala, and mountain ranges also run roughly from south to north along the Nigerian frontier, and from west to east across the centre of the Cameroons. The northern and eastern areas are high plateaux covered with

grass, which slope to the lowlands on the west, and with open forest and bush in some places.

The rainfall is very heavy in the western coastal area, amounting to 120 to 240 in. annually; with a humid and enervating mean temperature of 80° to 85° F. The wet season is from May to September. As the interior is approached the rainfall diminishes and in the northern area does not amount to more than 10 in. in the year. In the eastern area it averages 40 to 80 in.

The western or coastal region, through which General Dobell's force advanced on Jaundé, was unhealthy, the eastern area less so, and the northern area practically as healthy for military operations as a European climate.

There were two railways in the country, both running from Duala, one northwards to Nkongsamba a distance of some 100 miles, and the other of similar length, known as the Midland Railway, westwards to Eseka in the direction of Jaundé; but there were also light railways running northwards from Victoria and adjacent coastal posts along the eastern foot of the Cameroon Mountain for use in connection with the extensive cocoa plantations.

Road communications were by bush tracks, but there was one good motor road from Kribi on the coast to Jaundé. Rivers from the west coast were navigable for short distances, those running from the eastern areas into the Congo were navigable for long distances, and in the northern areas the River Benue running into the Niger was navigable to the Cameroon frontier and to Garua.

The medical services of the campaign were organized under unusual conditions, as the medical units of General Dobell's expeditionary force were hurriedly created at sea from the personnel picked up as he went down the coast. They were composed mainly of medical officers of the West African Medical Staff with a varied assortment of equipment. Major Statham, R.A.M.C., was appointed Director of Medical Services by General Dobell and given the temporary rank of Lieut.-Colonel. On reaching Duala he had with him two other R.A.M.C. officers, Captain Booth from Sierra Leone, and Major Best, Special Reserve, who, as noted above, was the Principal Medical Officer, Southern Provinces, Nigeria, from Lagos; 26 medical officers of the West African Medical Staff; 6 nursing sisters, seconded from the service of the West African Colonies; 4 non-commissioned officers, R.A.M.C., and 20 native dressers; together with the medical staff of the French force which joined the expedition at Sierra Leone, consisting of 4 medical officers and 6 European and 12 native *infirmiers*

Country outside Coastal Belt.

Bush Country along the Midland Railway.

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organized as a regimental medical service and as a small field medical unit.

Both British and French personnel were reinforced or replaced from time to time, so that a total of 57 additional British medical officers and 13 French arrived during the campaign, while 39 British and 10 French left. The average strength of medical officers with General Dobell's columns was 35 British and 10 French, and at the end of the campaign the British personnel was 45 medical officers, 6 nursing sisters, 18 R.A M.C. non-commissioned officers, 6 Indian assistant surgeons, 20 colonial dressers, and 100 locally employed and trained medical subordinates.

Before disembarking Colonel Statham organized a field medical service out of the personnel and equipment at his disposal to suit the anticipated medical requirements of the campaign and a land attack on Duala from a base on the Dibamba Creek. He had arranged a regimental medical service for each battalion, composed of one medical officer and eight carriers with medical equipment, and one trained orderly and eight hammock bearers with four stretchers or hammocks with each company. Four sections of a field ambulance, each with a bearer or hammock division and a tent division, were also organized. The bearer division consisted of one medical officer, one R.A.M.C. non-commissioned officer, and 68 carriers for stretchers or hammocks, and the tent division of one medical officer, one dresser, and 24 carriers for medical stores and tentage. A medical officer was appointed to superintend convoys and evacuation to the advanced base on the transport " Appam " in Cameroon Bay, and from there to a hospital base at Calabar in Nigeria. The system of evacuation was for the regimental medical service to collect wounded to a regimental aid post; the bearer divisions of the field ambulance sections transferred them to the tent divisions; while the carriers bringing up supplies brought the sick and wounded to the base on their return journey. From there they were conveyed in barges to the " Appam."

As Duala surrendered without land fighting this medical organization based on the " Appam " did not come into operation, although it continued to be the means of evacuating sick and wounded until a hospital base was formed at Duala. Its general principles, however, remained the same, but it was modified to a considerable extent in order to make it more suitable for the subsequent bush warfare. A stretcher bearer corps of 200 natives, increased to 300 or more, was formed. They were given a special uniform, and were distributed as bearers to the battalions and field ambulance sections.

In bush warfare as previously conducted there was with each company or section of artillery a medical establishment of one medical officer and 40 or 60 carriers with a medical and surgical equipment and comfort boxes, and a carrier equipment of ten hammocks. This system was inadmissible in the medical arrangements for the Cameroons as 30 medical officers would have been required for regimental service alone, in addition to 200 or 250 medical carriers with each battalion. There would thus have been much wastage of personnel and material when companies were not actively engaged. The system adopted by Colonel Statham was to attach a section of a field ambulance to each battalion, but to make it transferable at need to assist other battalions in any action in which two or more battalions were together but only one engaged. It was thus to be regarded more as a column than as a regimental unit. Originally it was organized with three medical officers, one R.A.M.C. non-commissioned officer, two dressers, four to six trained native orderlies, and 132 carriers for stretchers, hammocks and equipment, but owing to the unsuitability and inexperience of the dressers arriving as reinforcements, and also to the necessity of economizing medical officers and making provision for the base and lines of communication and for a medical service with detached companies, the section of a field ambulance was altered to two medical officers, two R.A.M.C. non-commissioned officers and four to six trained orderlies, while the carrier strength was reduced to 32 or 48 stretcher bearers and 32 or 48 carriers for equipment.

The general principle of this new organization for bush warfare was to split up a field ambulance section into four smaller groups, or equipments as they were called, each suitable for attaching to a company, under a medical officer or R.A.M.C. non-commissioned officer. The alternative strength of carriers was intended to meet the requirements of battalions having a varying number of companies as well as to provide a scale for a field ambulance section moving with a light or heavy equipment. An evacuating field ambulance section was organized at the same time to act as an independent field medical unit in echelon behind the sections with battalions.

The intention was to employ the lightly equipped field ambulance sections with battalions in columns, to which an evacuating section was attached, and the heavily equipped with columns that had no evacuating section.

The light equipment sections consisted of four sets of the following, each with a medical officer or R.A.M.C. non-commissioned officer in charge :—

BASE HOSPITAL, DUALA.

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1 Surgical pocket case and haversack.
1 Box of drugs (chiefly "tabloids").
1 Surgical dressing box.
1 Box of medical comforts such as milk, bovril, and brandy.
1 Aluminium water carrier with a set of chlorine apparatus to sterilize water.
1 Filter, if available.
2 Loads of hammocks (one suitable for Europeans).
1 Load of ground sheets and blankets.
1 Load of lamps and cooking pots.

Each set required eight carriers. The heavy equipment was the same but with the addition of two stretchers, four native hammocks and one European hammock, together with such other equipment as might be required. Each of the heavy equipment sets required 12 carriers.

One trained orderly and eight uniformed stretcher bearers were attached to each infantry company or section of artillery. They formed part of the field ambulance section and carried out only technical duties with the company, such as sanitation and stretcher bearing under a medical officer or non-commissioned officer of the section.

The evacuating field ambulance section had a smaller personnel, namely, two medical officers, one non-commissioned officer and 48 carriers, but a larger equipment consisting of :—

2 Surgical dressing boxes and operating case.
2 Medical field cases.
2 Medical comfort boxes.
2 Loads of blankets.
2 Loads of lamps and cooking pots.
2 Loads of water carriers, and sterilizing apparatus.
4 Loads of light hammocks.
4 Loads of European hammocks.
2 Loads of stretchers.

There were also with the evacuating section 20 spare carriers for carrying sick and wounded forward in the event of an advance taking place before the patients could be evacuated down the line; but, as a rule, this was provided for by the supply carriers of the day, who would be attached to the evacuating section before proceeding on their return journey.

Aid posts or bush hospitals were established as required along the line of communication. At one time or another there were as many as one hundred of these, and over 40,000 sick and wounded, in addition to a vast number of out-patients, were treated in them.

At railheads clearing hospital units were formed. During the greater part of the campaign they were established by evacuating field ambulance sections in small German hospitals found there.

The transport "Appam" in Cameroon Bay was the first hospital established at the base. It was transformed into a hospital for 80 Europeans and 300 native sick and wounded, and proved of great service during the first month of the campaign. A hospital base was subsequently organized at Duala. When the Allied Forces entered the town they found no German hospitals open in it. There had been a European and native general hospital in the Bell Town division of Duala, and two smaller European hospitals and one native hospital in Aqua Town, its other division; while a fifth hospital of thatched huts was situated in the new native quarters of Duala, called New Bell Town. All of these buildings had, however, been gutted or pillaged before or immediately after the arrival of the expeditionary force. The equipment of the larger European and native hospitals had been removed by the Germans to a suburb of Duala called Deido, 4 miles north of the port, so as to be safe from shell-fire, and a war hospital had been established there.

The building of the European General Hospital had been occupied at first by a large number of German prisoners of war, but a small portion of it was taken up and equipped with a few camp beds and field medical equipment in order to serve as a European hospital. The only hospital in which any native beds could be found — the native railway hospital — was equipped as a native hospital from such stores as could be brought up rapidly from the "Appam." The German war hospital established in two mission houses at Deido was visited by the Director of Medical Services the day after his arrival in Duala. As it was outside the allied outposts, it was decided to bring a portion of their equipment to Duala at once to re-equip the European and native general hospitals. There were, however, over 20 European and 80 native sick and wounded at the German war hospital, so that it took several days with the few carriers available to close the hospital, and remove the equipment and patients to Duala.

Within ten days of the occupation there were three hospitals equipped and in working order: one of 12 beds for Europeans in the European hospital building, one of 70 for native troops in an adjoining building, and a third of 80 beds for carriers. Six weeks later these figures had been increased to 80 beds for Europeans, and 310 for native troops including carriers. Laboratory, operating theatre and X-ray rooms were gradually

HUTTED HOSPITAL, DUALA.

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added, and the hospitals steadily increased till they formed an allied hospital of 1,500 beds with two European divisions, one for British and one for French, two divisions for the British native troops, and one for the French native troops, and a division for carriers. Besides this there was an auxiliary French hospital for 20 European and 400 native beds at Aqua Town, an Indian hospital for 50 beds at Bonaberi, on the opposite side of the river, and, later on, smaller French and British hospitals at other places in advance of the base. The numerous urgent cases among the civil population and the reopening of the large German cocoa plantations with their thousands of labourers necessitated the formation of a medical staff and hospitals to deal separately with them. The small depôt of medical stores brought ashore to meet urgent needs when the force landed grew into a large organization, with a special staff, and occupied several buildings.

After the capture of Duala, the main force under General Dobell, consisting of British and French West African troops and officers and men of the Royal Navy and Royal Marine Light Infantry, formed several columns which operated in different directions. A French column captured Jaboma where the Midland Railway crosses the Dibamba Creek, 4 or 5 miles east of Duala, but its further advance was checked for the time being. A British column advanced up the Wuri river on Jabassi. After sustaining a serious check it eventually took Jabassi on the 14th October, 1914, and pushed out to Njamban. Three columns then operated against Edea, a station of the Midland Railway, one column advancing along the railway line from Japoma, another as an armed flotilla up the Sanaga River, and the third, or main column, up the Nyong to Dehane, some 20 miles south of Edea, and thence by land. Edea was occupied by these combined movements on the 26th of October, 1914.

Progress against the enemy by columns operating along the northern line of railway was continued; operations were also carried out from Duala with the object of securing Buea, the hill station on the Cameroon Mountain, and the adjoining country including the coast town of Victoria. A naval force moved by sea to Victoria, a second force went by sea to Tiko and thence by land, while a third operated westwards against Buea from the railway line at Susa. Their objectives were secured by the 15th of November, 1914.

With the occupation of Buea a convalescent depôt was established in the German settlement which is situated some 3,000 ft. above sea-level. Fresh milk and vegetables were obtainable there, but the climate was very damp and misty

during the greater part of the year, and not very suitable for the purposes of a sanatorium.

Operations were then conducted to clear the whole of the northern railway, and the country north of its railhead. The railhead, Nkongsamba, was occupied on the 10th December, 1914, and the force pushed on northwards to the German fortified post of Dschang, but withdrew to railhead and its outpost Bare, after razing Dschang to the ground.

The situation of the main force based on Duala at the beginning of 1915 was that British troops held the line of the Northern Railway and Bare, the coast town of Victoria, and a defended post, Dibombe, south-west of Jabassi; and French troops the line of the Midland Railway as far as Edea, with a detachment on the coast at Kribi.

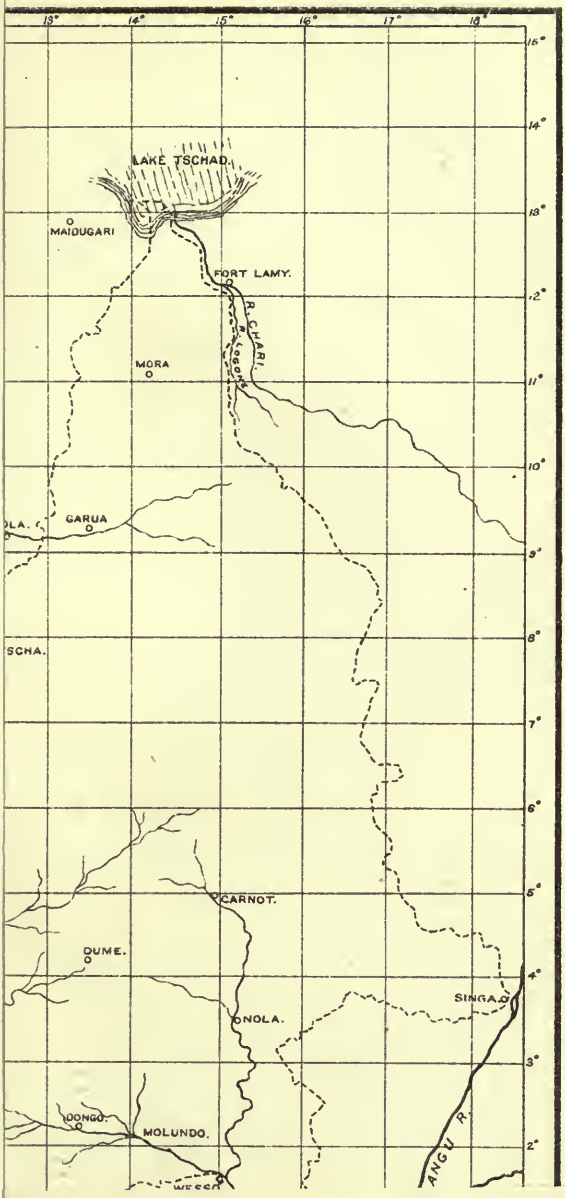
At the same time columns were operating against the Cameroons from Nigeria and French Equatorial Africa. The force of French and Belgians under General Aymerich was moving from the east and south in the direction of Jaundé towards the end of 1914, but at that time it was some 400 miles distant from General Dobell's force. The column from Northern Nigeria was a mixed British and French Force watching the German posts of Mora and Garua in the extreme north of the Cameroons; while the Cross River force from Southern Nigeria was in contact with German forces near Ossidinge.

In January, 1915, it was decided to prosecute the campaign more actively in the Northern Cameroons with troops under the command of Brig.-General Cunliffe; and during the year his column was actively engaged in reducing the fortified post of Garua and clearing the country southwards over the central plateau in order to converge on Jaundé with General Dobell's main force.

General Aymerich also continued his operations from the east and south-east during 1915 and converged on Jaundé at the end of the year.

In April, 1915, General Dobell issued orders for an advance on Jaundé which was to be made in conjunction with a similar movement of the French force from the East. A British force under Lieut.-Colonel Haywood was concentrated at Ngwe, 30 miles from Edea, on the forest track between the railway at Edea and Jaundé, and a French force under Colonel Mayer concentrated at So-Dibanga also about 30 miles from Edea where the railway crossed the Kele River. A force was also detached to the Sanaga River at Sakbajeme to protect the flank of the advance.

This advance commenced on the 1st May, 1915, the French reaching Eseka railhead on the Midland Railway on the 11th



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May, and the British Wum Biagas, some 50 miles along the forest track from Edea to Jaundé, on the 4th May, where it was joined by the French force, which had turned north from Eseka to meet it. The combined force then advanced from Wum Biagas under Colonel Mayer on the 25th May. The difficulties of this advance were exceptionally great, and by the 5th June only 12 miles had been covered against stubborn resistance and with many casualties. Dysentery also broke out. Lack of transport prevented food supplies coming up with sufficient rapidity, and a serious attack on a convoy of 500 carriers added to the difficulties. The advance was consequently abandoned and the force withdrawn, fighting rearguard actions, to Ngwe and the Kele River. Hostilities then ceased for the time being on the 28th June. The battle casualties in the operations were estimated at 25 per cent. of the force.

The northern column under General Cunliffe had captured the post of Garua on the 10th of June, and a British and French force was then set free to move south through the highlands of the Cameroons, leaving a containing force at Mora, a post which held out to the end of the campaign. The French and Belgian columns under General Aymerich were also converging on Jaundé from the south and east, and the British force from Southern Nigeria at Ossidinge was attempting to link up with General Cunliffe's force and with the British force operating from the northern railhead at Nkongsamba and at Bare. Detachments were also sent to operate near the Nyong and Campo rivers on the coast south-west of Jaundé.

During the temporary cessation of hostilities the 5th Indian Light Infantry arrived from the Straits Settlements and arrangements were made with the Governors of Sierra Leone, the Gold Coast and Nigeria for monthly reinforcing drafts of carriers. The roads were made fit for heavy traffic and adequate motor transport had been sent from England.

These preparations enabled General Dobell to commence his second advance on Jaundé on the 22nd September, 1915. The British and French columns went forward as in the first advance from Ngwe and the Kele river. The former reached Wum Biagas on the 9th October, and the latter Eseka on the 30th October. The bush track from Edea to Wum Biagas was converted into a good motor road. On the 23rd November the final advance was commenced, the British force being based on Wum Biagas and the French on Eseka. The former fought its way to the more open and cultivated country at Dschang Mangas by the 17th December and the latter to Mangeles by the 21st December. The British force pushed on to Jaundé

and entered the town, as already noted, on the 1st January, 1916. The French force reached the Kribi-Jaundé road from Mangeles shortly afterwards, and the French and Belgian troops from the east and south also entered Jaundé during the first week in January.

The Northern and Southern Nigerian columns and the column of the Western force operating from the Northern railhead met at Fumban at the beginning of December, 1915. General Cunliffe's column had been engaged in November in a difficult attack on a mountain fortress at Banjo, and after its capture had sent detachments to join the other columns at Fumban. General Cunliffe then pushed on to the Sanaga river and established touch with the main force moving on Jaundé, leaving small forces to clear up the country beyond Jabassi. The losses during these operations were slight and the health of all ranks was considerably better than that of the troops operating in the coastal belt.

In these varied and numerous operations the system of evacuation and methods of transport of sick and wounded differed considerably. From the British columns operating in the Northern Cameroons casualties were evacuated to Maiduguri in the extreme north of Nigeria during the earlier operations against Mora in August, 1914, a five days' journey. Maiduguri continued to be the base to which sick and wounded were evacuated from the force left to contain Mora when General Cunliffe's main column marched south.

In the unsuccessful attack on Garua in August, 1914, Yola was the base. The two medical officers with it, Drs. Lindsay and Trumper, West African Medical Staff, who had been left to pick up wounded when the column retreated, were captured and remained prisoners till released eighteen months later after the capture of Jaundé. They had been interned in a camp south of Jaundé on the Nyong river. Yola continued to be the British base to which wounded were evacuated during the later allied operations against Garua. After its capture the column advanced south by way of Kontscha, and the line of evacuation was then continued to Yola, with an intermediate aid post under a medical officer at Kontscha.

When General Cunliffe's column was joined by a column based on Ibi for operations against the Banjo mountain fort on the 4th to 6th, November, 1915, the line of evacuation through Kontscha to Yola was abandoned and the sick and wounded were then evacuated through a bush hospital at Banjo to a medical base at Ibi. After the capture of Banjo, General Cunliffe's column moved south to N'gombe, sending a small column to Fumban to gain touch with the Cross river

SECTION OF FIELD AMBULANCE ON LIGHT SCALE,

Consisting of 4 equipments, with 32 carriers (these wore no uniform). The carriers in the photo. are stretcher bearers acting for them.

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Column and the column from Bare. The line of evacuation both from Fumban and N'gombe continued to be to Ibi.

The French forces with General Cunliffe's column were based originally on Fort Lamy at the junction of the Lagone and Chari rivers, not far from Lake Tchad, and their sick and wounded were evacuated to it during August and September, 1914. In the operations against Mora and Garua they continued to be evacuated to Fort Lamy, an eight days' journey, but after the fall of Garua the French made a medical base there. The Garua, Yola and Ibi medical bases were on the navigable Benue river, and the French sick and wounded were evacuated by river craft from Garua to the sea and thence to French colonial bases. British sick and wounded were also sent by river from Yola and Ibi to Lokoja on the Niger when necessary.

After General Cunliffe's allied column had reached the Sanaga river the sick were taken on with the column to Jaundé and evacuated thence to Duala by the line of evacuation of General Dobell's main force.

The Cross River Column was based on Ikom, with a subsidiary base at Calabar on the Nigerian coast. When it was attacked at Nsanakang on the 26th August, 1914, only one European and 14 native ranks, amongst the wounded, were left alive. As there was also a large number of German wounded at the time in the area round Nsanakang the British consented to respect the area as neutral in order that the Germans, who had forcibly retained the only medical officer with the British force to assist in the care of the wounded, might collect them. In the later operations the sick and wounded were sent down the Cross river from Ikom to Calabar; but when the column joined forces with the Northern Railway column from Bare in the operations against Fumban its sick and wounded were evacuated by Bamenda and Dschang to the railhead at Nkongsamba and thence to Duala. From Duala they were evacuated by sea to the hospitals at Calabar.

The French and Belgian columns operating against the eastern and southern areas of the Cameroons depended on river lines of evacuation to a very great extent. The southern force had its medical base at Libreville, a distance of 400 or 500 miles from Ambam, which was the point reached before its final advance on Jaundé. It had about 400 battle casualties. Aid posts were formed on lines of communication at Oyem and N'Djole to which the sick and wounded were carried by bearers. At N'Djole they were taken by river launches down the Ogou to Cap Lopez where there was a small hospital, and thence by sea-going ships to the general hospital at Libreville.

The eastern columns under General Aymerich advanced in

two portions, the most southern from Bonga on the Congo at its junction with the Sanga river, and the other from Singa on the Ubangu river, which joined the Congo some 100 miles north-east of Bonga, and from posts farther north. Both the Sanga and Ubangu were navigable, the Sanga to Nola and some 150 miles farther north to Carnot. The Dscha river which flowed into the Sanga at Wesso, on the frontier between French Equatorial Africa and the Cameroons, about 140 miles south of Nola, was also navigable as far as Molundu and Dongo some 100 miles in a north-west direction. A small hospital base with stores was established at Wesso. In the advance to the westward of the Sanga from Carnot and Nola the columns had to rely on land transport, and also in the advance from Singa on the Ubangu to Carnot on the Sanga. From Carnot to Dumé, from which the final advance on Jaundé was made, hand carriage over a distance of some 250 miles had to be used. On the navigable rivers sick and wounded were brought down in comfort by steam launches to base hospitals at Brassaville on the Congo.

The various expeditions by the columns of the force based on Duala had also their own special means of evacuation.

The Jabassi expedition in October, 1914, was up the Wuri river by a flotilla of river craft. One of the river boats acted as a dressing station and, when the force was withdrawn, brought the wounded down to Duala. In this small expedition 3 Europeans and 13 natives were killed, and one European and 25 natives wounded.

In the operations from the 1st October to the 6th October, 1914, to secure Japoma, where the Midland Railway from Duala crosses the Dibamba Creek, 4 British and 29 French were killed or wounded. They were evacuated to the French ambulance at Aqua Town by hammocks and hand-pushed trucks along the railway line, and thence to the general hospital.

In the operations along the Northern Railway sick and wounded, during the fighting in October and November, 1914, were also sent down the line in hand-pushed trucks or in hammocks as far as Bonaberi, and thence by launches across the Creek to Duala. In the subsequent advance to railhead in December, 1914, the only casualties were 12 killed and wounded in an action at Nlohe bridge. An advanced dressing station was formed there and the wounded evacuated down the line to Bonaberi by a train sent up with medical personnel for the purpose. On the capture of railhead at Nkongsamba, a small German hospital was taken over and became a clearing hospital for the advance to Dschang at the end of the month. Fifteen miles north of railhead the advancing column divided

and a small post was formed at Melong, on the line of evacuation to railhead. The column withdrew to railhead after destroying Dschang on the 7th January, 1915. During the operations against Dschang and after the return of the forces to Nkongsamba, 133 soldiers and 323 carriers were evacuated down the line to Duala. The evacuation to railhead was by hand carriage over a distance of 50 miles. The battle casualties were 6 killed and 17 wounded.

In February, 1915, there was much fighting in the neighbourhood of Bare and Melong, north of the railhead. Ninty-nine wounded were collected in attacks on enemy positions, 4 or 5 miles north of Bare, to a main dressing station there, and thence evacuated to railhead and Duala. In the final advance on Dschang and Fumban from the northern railhead, in October, 1915, aid posts were formed at Mbo, Dschang, Bogam, and Fumban, and sick and wounded evacuated through them to the clearing hospital at Nkongsamba.

In the operations against Edea on the Midland Railway in October, 1914, by the land column and the river columns on the Sanaga and Nyong the casualties were 45 killed and wounded. A clearing hospital was formed at Dehane on the Nyong river, through which 30 sick and wounded were evacuated by river craft to Duala. The sick and wounded of the railway column, 30 in all, were taken down the line by hand carriage to Japoma, and thence by train to Duala. A German hospital was found at Edea, and a French ambulance was established in it for the remainder of the campaign.

During the advance from Edea towards Jaundé in April, 1915, a British clearing hospital was established at Edea, and two ambulance coaches were run by rail from there to Duala. The French field ambulance acted as a stationary hospital, and continued to treat the French sick and wounded until they were fit for evacuation to Duala. In the first phase of the operations against Ngwe the carriage by hand to Edea was over a distance of 30 miles. The further advance from Ngwe to Wum Biagas in May extended the line of hand carriage to 60 miles. Although there were few wounded, large numbers of dysentery cases occurred during this period. They filled the bush hospitals, which consequently had to be constantly cleared to Edea to avoid further congestion.

In this phase of the operations the British and French troops had been operating on separate though parallel lines; but when, at the end of the phase, the French and British columns concentrated at Wum Biagas for a further advance they formed an allied force of 3,500 soldiers and carriers. A comprehensive scheme for evacuation of sick and wounded and for establishing

medical posts had to be considered. Lieut.-Colonel Statham consequently joined the allied force, which had been placed under the command of Colonel Mayer of the French contingent, in order to direct the medical arrangements from Wum Biagas.

An allied field ambulance, with a British and French section, was formed in addition to the section with the British troops and the regimental medical service of the French. The material with the section of field ambulance which had hitherto accompanied the British column was reduced till it consisted of four medical equipments (20 loads), the loads of spare blankets, hammocks and hospital equipment being transferred to the British section of the allied field ambulance. This change rendered the ambulance section of the British troops more mobile and approximated it more to the regimental medical establishment with the French troops.

The medical services then with the force, which consisted of 627 British troops and 1,007 carriers and 837 French troops and 884 carriers, were as follows :—

Regimental Medical Service.

Personnel :—

British.	*French.*
1 Senior medical officer.	2 Medical officers.
3 Medical officers.	2 European infirmiers.
1 R.A.M.C. N.C.O.	8 Native infirmiers.
2 Dressers.	No regular stretcher bearers.
48 Stretcher bearers.	30 Carriers as a minimum for equipment and available spare as required.
20 Carriers as a minimum for equipment and augmented from supply carriers when necessary for wounded and sick.	

Materiel :—

4 Medical equipments (12 Panniers).	6 Medical panniers.
20 Stretchers or hammocks.	30 Stretchers.

Allied Field Ambulance.

British Section.

Personnel :—

2 Medical officers.
1 R.A.M.C. N.C.O.
2 Dressers.
40 Carriers for equipment.

Materiel :—

24 Medical panniers.
30 Hammocks or stretchers.

French Section.

Personnel :—

1 Medical officer.
3 European infirmiers.
2 Native infirmiers.
70 Carriers.

Materiel :—

10 Panniers.
40 Stretchers.

THE 4-STRETCHER BEARER SQUADS,

Which were attached to each battalion and formed the bearer division of the section of field ambulance.

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Aid Posts (British).

Two were established at Ngwe and Wum Biagas and two more arranged for, each with :—

Personnel :—
1 Medical officer.
1 N.C.O.
1 Dresser or trained orderly and a sanitary gang.

Materiel :—
40 Medical panniers and loads.
30 Stretchers.
70 Light hammocks.

Clearing Hospital at Edea (British).

Personnel :—
1 Medical officer.
1 N.C.O.
1 Dresser.
8 Stretcher bearers.

Materiel :—
90 Medical panniers and loads.
30 Stretchers.
70 Hammocks.

The allied field ambulance marched with the main body of the column, and the British and French regimental medical sections with the advanced guard, according to whether the advanced guard was found by British or by French troops. They evacuated their sick to their own section of the allied ambulance.

Owing to the enemy's stubborn resistance the advanced guard was rarely half a mile in front of the main body instead of half a day as originally intended, so that the evacuation from the regimental units to the allied field ambulance could be carried out continuously.

These extensive medical preparations had been necessitated by the size of the force, the probability of much sickness and heavy fighting, and the distance, 140 miles, along which sick and wounded men would have to be evacuated after Jaundé was reached.

There was also the probability that not only the sick and wounded of Colonel Mayer's allied column, but also those of the French columns marching on Jaundé from the south and east, would have to be evacuated through Edea, while the enemy wounded might also require treatment and evacuation. The allied column, however, after fighting for three weeks, never got farther than 12 miles from Wum Biagas, and in that short distance had lost one-third of its fighting effective by wounds and disease.

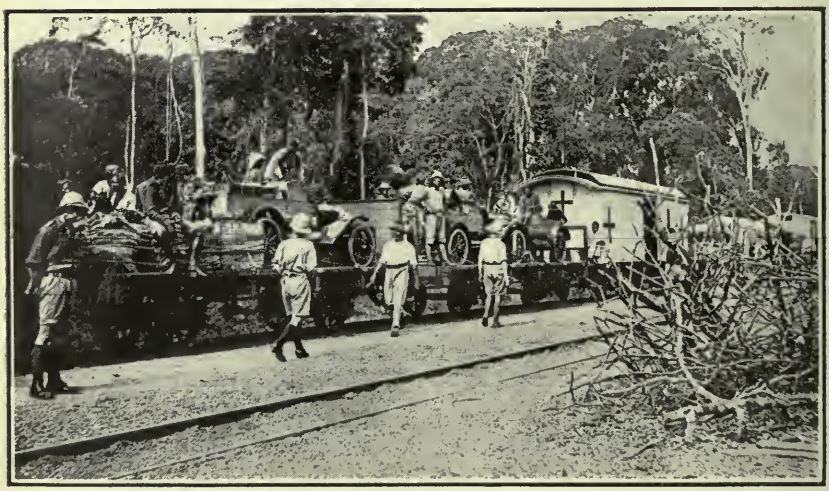
During these operations 500 sick and wounded were evacuated in ten convoys to Edea and Duala. The system of evacuation was to utilize the returning supply carriers for carrying the wounded and sick. Three motor lorries working between Ngwe and Edea also helped in the evacuation between these two places. The sick convoys rested at aid posts, and a medical officer or non-commissioned officer took charge of them from one post to the other.

In the final advance on Jaundé, which commenced in October, 1915, from Ngwe and So-Dibanga, the positions at Wum Biagas and Eseka, the former of which was occupied on the 9th November after a thirty hours' fight and the loss of 28 killed and wounded, and the latter on the 30th November with a loss of 28 killed and 85 wounded, were consolidated and prepared as advanced bases. The road to Wum Biagas was made suitable for motor traffic and the railway repaired to its railhead at Eseka. The advance was resumed on the 24th November, the main British column throwing out flanking columns to the left and right, the former operating to the north as far as the Sanaga river, and the latter keeping touch with the main French column. Strong opposition was met with at various points. At the Puge river, 15 miles east of Wum Biagas, 25 of the British column were killed or wounded, and at Lesogs on the Kele River there were 75 killed or wounded in the southern flanking column. Between the 8th and 17th December, when the columns emerged from the thick bush country to open cultivated land at Dschang Mangas, 7 Europeans and 78 natives had been killed or wounded. During the remainder of the advance to Jaundé there were 57 casualties in rearguard actions. The total British losses in the advance from Wum Biagas to Jaundé between the 24th November and 1st January were 238.

The French column advancing from Eseka lost 203 killed and wounded and had only advanced 23 miles between the 24th November and 21st December, when Mangales was reached and where it halted till the 29th December. In its subsequent advance 32 more casualties occurred, but after the 4th January the enemy opposition against this column ceased.

The sick and wounded of the British columns were evacuated through the clearing hospital at Edea. This hospital was equipped for 8 European and 150 native beds, with one medical officer, one R.A.M.C. N.C.O., and a dresser. A depôt of medical stores was formed at Ngwe, and medical posts were established at Sakbayeme on the Sanaga river for the northern flanking column, and at Bombe on the Edea–Ngwe road for the main column. After the capture of Wum Biagas the advanced medical depôt was moved to it from Ngwe, and subsequently, as the advance progressed, to Ngung and then to Dschang Mangas. Small defensive posts were formed along the lines of communication and medical personnel was sent from Duala to each. The southern flanking column evacuated its wounded from Lesogs by bush paths to the French railhead at Eseka. The northern flanking column carried its sick and wounded with it until it joined the main column. By the time the British

Motor Road on way to Jaundé.



Ambulance Coach on Railway.

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force had reached Jaundé there were seven aid posts between that place and Edea, each with a bush hospital, a medical officer, and a N.C.O. of the R.A.M.C. or dressers. At some posts there were two medical officers, one of whom accompanied convoys of sick and wounded. At Dschang Mangas and Wum Biagas the posts and hospitals were larger and had on an average 100 in-patients as well as a large number of out-patient soldiers and carriers.

During the period November 12th to February 29th, 117 Europeans, 855 native soldiers and 3,426 carriers of the British force were evacuated to Duala through the bush hospitals on this line of communication and through the clearing hospital at Edea.

The transport was by hand on stretchers or in the hammocks of returning supply carriers as far as Ngwe until such time as the roads were made fit for motor transport. Afterwards it was by motor transport with the exception of a section of 22 miles of hilly road unfit for motors between Dshang Mangas and Wum Biagas. The motor transport consisted of four Ford ambulance cars augmented by all available supply lorries. As regards comfort there was not much difference between the Ford cars and the supply lorries.

The journey by rail from Edea to Duala in ambulance coaches took four hours ; and the total journey from Jaundé to Duala six days or longer.

The evacuation of sick and wounded of the French column was much simpler, as three-fourths of its advance was along the line of the Midland Railway. The column had eleven medical officers and a considerable number of subordinate medical personnel. Six of the medical officers were with the troops, one was with a field ambulance section, which followed the main column, and the rest were distributed to medical posts at So-Dibanga, Eseka and Mangales.

During the coast operations from Kribi and Campo, medical bases were formed at these places and the sick and wounded evacuated by sea to Duala.

During the operations which were conducted southwards after the capture of Jaundé and which drove the German forces into Spanish territory there were few battle casualties but a considerable number of sick. The line of evacuation was a long one ; the sick and wounded were carried by hand to the Kribi–Jaundé road at Olama, where a clearing hospital was formed. At first they were evacuated from there by motor transport to Jaundé, and thence by the Jaundé-Edea line of communication to Duala ; but later on all sick from Olama were taken by motor transport to Kribi and thence

by sea to Duala. The French column operating south of Jaundé evacuated their sick direct to Jaundé.

The means as well as the system of transport differed in the various expeditions. In the open country of the Northern Cameroons horses and even cattle were ridden by sick and lightly wounded, but generally and with all serious cases hand carriage in stretchers or hammocks, often for very long distances, was necessary. The second stage of transport from the Northern Cameroons was usually by large canoes or barges down the Benue, Niger, and Cross rivers from the medical bases at Yola, Ibi and Ikom to Nigerian depôts or ports. At one period the Niger was closed for sick transport owing to the presence of sleeping sickness and the tsetse-fly along certain of its reaches; but the use of mosquito-protected boats overcame this difficulty.

In the south and east, where the French columns of General Aymerich operated, the use of hand carriage was necessary until either a temporary base or river transport was reached. The French forces made extensive use of the system of establishing small and isolated hospital posts on the lines of communication where serious cases could be left. The very limited numbers of their medical staff prevented a regular line of communication for sick being kept open. When the Lobaje, Sanga and Dscha rivers had been reached, boat transport became generally possible. Once a patient reached a navigable river like the Sanga he could be taken hundreds of miles down it and so on to the Congo and to Brazzaville if belonging to the eastern columns, or down the Ogowe and Gabun rivers towards Libreville if invalided from the French southern forces. Railways could not be employed with the French southern and eastern columns, and only very partially for the northern columns, and then not till they had already reached a large town or depôt.

With the coastal or western columns hand carriage was used along bush paths and on roads where no wheeled transport was employed, but on the more important of the various expeditions, those against Jaundé for instance, motor transport was used as far as possible for all but very seriously sick or wounded patients, in which case the gentler method of hand transport was employed. Railway transport was utilized when the line of railway was reached.

Various types of stretchers and hammocks were employed for hand carriage. The simplest type of stretcher in forest country was the bush stretcher which had a framework of light forest poles and a bed of thin strips of bark neatly entwined. Such a stretcher as this would be rigged up in half an hour

by the native carriers and was fairly comfortable and springy, and lasted about a week. In all the various columns operating in the forest region of the Cameroons this stretcher was used to the utmost possible extent. The use of bush stretchers saved transport, for there was no reason to return them from the base. The method was also hygienic, as stretchers soiled by septic wounds or dysenteric evacuations could be thrown away when necessary. A better class of bush stretcher was occasionally used. It was made from poles of the tumbo palm, an exceptionally light wood, with a matting of its fibre or of similar fibre as bed. This bush stretcher was very light and nearly as comfortable as a canvas stretcher, but it took about a day or two to make. These stretchers, however, lasted very well.

With most of the columns, for immediate use and for the transport of Europeans and bad cases, a certain number of canvas stretchers was carried. The stretchers of the companies were of this pattern and a reserve, varying with the various forces, went with the companies or with sections of field ambulances. They were of two types, the regulation folding stretcher and a rigid stretcher locally constructed of pitch pine and canvas. By making the stretcher poles rectangular, and fixing them so as to support the weight on their greater diameter, the thickness could be cut down till the stretcher did not weigh more than 22 lb. as against 30 lb. of the army pattern.

As the native carriers carried stretchers as well as hammocks on their heads, light head-boards were fixed to the ends of the rigid stretchers, and for this reason these light rigid stretchers were generally preferred to the army folding pattern to which transverse head-boards could not be attached.

The ordinary type of hammock used on the West Coast consists of a heavily constructed wooden framework covered with canvas. This forms what is called a hammock top. Suspended below this is the body of the hammock which generally consists of intertwined string or of some kind of canvas. These tops were so heavy that, although they had certain advantages in comfort and were used in some of the other forces, they were discarded with the western force, and a hammock with a very light top, made from four light tumbo poles and a seven foot by three and a half oblong of canvas, used instead. The top weighed about 5 lb. as against the 40 to 50 lb. weight of the old pattern.

Instead of a hammock body of string or canvas, a naval cot could be slung under a hammock top. The ordinary naval cot is fairly heavy and in order to save weight a cot was designed

with a framework of tumbo poles and with sides lower than those of the naval cot. This modified naval cot, when carried slung on the light top already described, proved an exceedingly suitable combination, which Lieut.-Colonel Statham strongly recommended as the most suitable for use in the future.

The general conclusions come to by medical officers with the northern and western columns was that string hammocks rotted so easily as to be unreliable, that wire should be used instead of nails to join the hammock poles, as the latter split and destroyed the poles, that plenty of spare rope should be carried in the equipment, and that every eyelet in cot or hammock should be ringed with metal.

Canvas stretchers and hammocks, though marked for urgent return to the front from the lines of communication, usually took days and weeks to come back. For this reason a spare stock was absolutely necessary, and the most economical method of distributing them was always a problem. The method adopted with the western columns was to keep spare stocks of hammocks and stretchers at each aid post or bush hospital on the lines of communication. An empty one then went up as the loaded stretcher or hammock came down the line. It was only by constructing specially light stretchers and hammocks that this spare stock could be maintained. The ordinary heavy type would have employed an unjustifiably large number of supply carriers for their transport.

The system of carrying a stretcher or hammock on the head, though suitable in the case of the hammock where the body hangs lower, is unsuitable in a stretcher where the patient is kept six feet or so above the ground. It was only rarely, however, that carriers could be trained to carry patients with their hands or on their shoulders. Trained hammock bearers travel safely and rapidly, but, as they march in step, they jolt the patient a good deal. To teach the African the broken step was even harder than teaching him to carry a stretcher on slings. For this reason the corps of stretcher and hammock bearers formed with the western force was of the greatest value. Kept at one class of work they became skilful at carrying, and their uniform gave them self-respect and the courage required to collect wounded from the firing line. Bitter complaints were made by the medical officers of other columns because of the constant changing of the medical carriers and the consequent discomfort to patients from being carried by men who were not thoroughly trained or experienced.

Motor transport was only used by the western column, the four Ford ambulance cars and every available supply lorry being utilized. The Ford ambulances could not carry

Motor Ambulance Cars.

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satisfactorily the theoretical load of four in consequence of insufficient space, and with two they were somewhat jolty from being too lightly loaded. The supply lorries, though somewhat too short for a lying down case, were comfortable and carried down large numbers of sick and wounded safely and expeditiously. Rail transport was also only used with the western columns, six coaches being fitted out, usually with sixteen bunks in each. They proved comfortable and very useful.

Medical stores were brought from the West African colonies, chiefly from Nigeria, with the expeditionary force. Monthly and quarterly consignments were subsequently obtained from England. These included hospital clothing and bedding, field medical equipment, field medical stores and comforts, base hospital supplies, and medical stores for the plantations and for the civil population. They were housed in four buildings at the Duala general hospital and supplied not only the expeditionary force, but also the British Navy, the French troops, 14 small hospitals of the cocoa plantations, which had a population of 12,000, and the police, prison and civil population of the occupied territory. A carpenter's shop was established in connection with the medical stores, where some 800 hospital beds and 120 hammocks and stretchers were made at small cost. The stores issued to medical units in the field consisted of over 1,000 loads of medical and surgical material and 2,000 loads of equipment.

Measures for the prevention of disease included water sterilization, destruction of insects and vermin, and questions connected with rations and clothing. Fifty-two thousand and forty men were employed on sanitary services at a cost of 1*s*. 6*d*. daily between October, 1914, and March, 1916, the numbers varying in each month from 7,382 in October, 1914, to between 2,000 and 3,000 monthly up to December, 1915, and January, 1916, when some 4,000 were employed in each of these two latter months. In the Duala areas alone some 900 were employed chiefly in disposing of empty tins and bottles, in the removal of garbage and latrine contents, and in the destruction of mosquitoes and rats.

Duala had a good water supply from deep wells, distributed to standpipes and houses, and general measures of sterilization were not required. In the field, boiling and chlorination were employed, but it was difficult to prevent the West African native, who often prefers water with a taste in it, from drinking from polluted sources.

Anti-mosquito measures were mainly directed towards the prevention of yellow fever through stegomyia mosquitoes.

Tins and receptacles which were apt to be breeding places were buried, and so many millions were thus disposed of that considerable areas of ground were reclaimed. There was always a danger of serious outbreaks of small-pox, and a monthly supply of vaccine enabled the medical staff to vaccinate many thousands of the natives. Plague was apt to be imported from French Guinea and Dakar. Suspected cases were examined bacteriologically and the destruction of rats was carried out on a large scale.

The rations of the European troops had a high calorie value, but that of the native soldiers and carriers consisted only of ¾ lb. biscuit, ¾ lb. rice, and ¼ lb. meat, or ¼ lb. biscuit, ½ lb. meat, and ⅛ lb. chocolate. The calorie value was consequently extremely low, but the native could supplement the ration by bananas, cassava and yams found on the line of march, thus effecting much economy in transport.

The health of the troops, with the exception of those operating in the northern areas, was a constant cause of anxiety. The total strength of the forces based on Duala varied from time to time. At one time or another, exclusive of British and French naval personnel, there were 864 British and 805 French European troops, 5,927 British and 5,699 French native troops, 14,184 British and 5,035 French imported carriers, and 10,000 to 15,000 carriers obtained locally for the British and an indefinite number for the French.

To deal separately with the varying health conditions of each of the numerous columns has not been possible, and general statements must be accepted as only approximately accurate. The sick-rate of the column depended not only on the physical questions of climate, food, and water supply, but on various psychological factors, such as success, excitement and movement, which were found to diminish the sick-rate; while reverses and prolonged halts greatly increased it.

The reports of medical officers with the northern columns varied considerably. The sick-rate of the troops of the Ibi and Yola columns, when these halted, was stated by some to be 20 or 25 per cent., while the rates amongst the carriers were much lower. On the other hand, the health of the Yola column, when on the march, was stated by one medical officer to be only 2 or 3 per cent. With the coastal forces and the Cross River column from Southern Nigeria, which operated in very unhealthy country during most of the campaign, 15 to 20 per cent. of the troops were treated either as in- or out-patients when the troops were on the march, and 30 to 40 per cent., and occasionally more, when the troops were stationary. Although no definite information is available from the French

WARD IN BASE HOSPITAL, DUALA.

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eastern columns, it was ascertained from combatant and medical officers with these columns that the sick-rate during most of the advance had not been high.

It is impossible also to standardize the results in the various forces operating in the Cameroons, owing to their medical arrangements being dissimilar. Few or no actual statistics are available from any other force than the western, and the only accurate information available regarding diseases is obtained from an analysis of 24,261 in-patients and of 25,000 out-patients treated at Duala base hospitals.* The impossibility of keeping reliable statistics and collecting them from numerous small columns widely separated in a bush country rendered any complete collection of figures impossible.

The most remarkable fact shown by these figures of in-patients and out-patients was the number of cases of tropical ulcer, which formed over 90 per cent. of the 7,200 cases of minor septic diseases, or over 25 per cent. of the entire number of cases admitted; and 12,928 out of the 25,000 out-patients or 50 per cent. of all the out-patients' cases. In the northern columns this disease was not nearly so prevalent while they operated in the healthy upland plateaux, but its incidence rapidly increased as the northern troops entered the low-lying bush country, till finally some 20 per cent. of the native troops and 30 per cent. of the carriers were affected. Tropical ulcer, besides spreading rapidly in the unhealthy coastal region and becoming almost epidemic in the nature of its increase, proved so difficult to cure as to render any soldier or carrier affected with it unfit for service for weeks. Unless the ulcer was a small one and treated early, invaliding was found to be the soundest policy to adopt in these cases. Of 12,071 allied cases invalided during the course of the campaign and 1,200 invalided within a month or two after its cessation, 32 per cent. were returned as tropical ulcer. Of these cases 3,976 were from amongst the 9,877 carriers invalided. There were no cases of this disease amongst the 519 European military invalids, and only 126, or 13 per cent., from amongst the 1,675 native soldiers who were invalided.

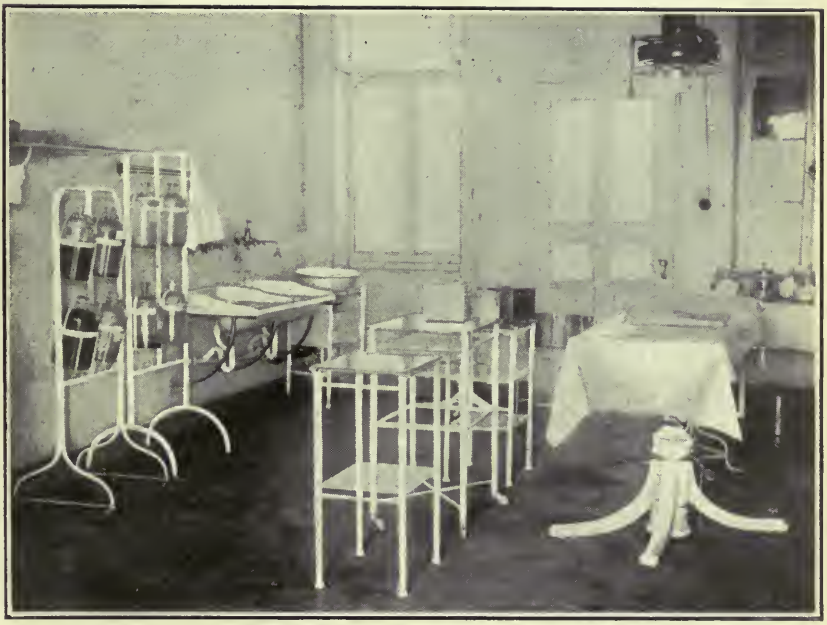
These figures show the value of foot and leg protection in preventing this disease, a point which was still further brought out by its incidence amongst the French native troops who always wore trousers and amongst whom only 46 cases occurred, or 5 per cent. amongst 990 invalids. The British native troops wore foot protection, but leg protection in only some of

* See Aopendix F.

the units. Foot and leg protection greatly reduced the sick-rate due to cuts, abrasions and chigger sores as well as tropical ulcer, and some form of soft ammunition boot combined with the wearing of cheap strong leggings would have been highly beneficial for all ranks. Boots were tried with a section of one Nigerian battalion, but were not a complete success owing to blisters developing on the men's feet. The period of trial, however, was too short to be decisive, and the native soldier has to be accustomed to his boots long before he enters the field. Sandals and chupplies, which were much worn, did not protect the feet as well as boots, nor did they keep out chiggers equally well.

About 346 of the minor septic admissions were due to chiggers, some 5 per cent. of the total, but this percentage did not represent the prevalence of this pest in certain areas of the Cameroons, where its serious effects upon those native soldiers who had no experience of this minute burrowing insect or how to extract it without leaving a small sore where it burrowed, caused at one period serious military inconvenience. The Northern Nigerian troops employed with the western column, were crippled at one time by chiggers and were only rendered fit by the combined employment of sandals and frequent foot inspections. For treatment the feet were coated with mixtures of paraffin and tar, and the stretcher bearer corps, who were mainly Sierra Leone carriers, were detailed as company chiropodists.

Of specific diseases malaria occupied the most important place in all the forces operating in the Cameroons. The Duala hospital admissions, however, do not give any idea of the prevalence of this disease amongst Europeans, as the greatest number of attacks took place while they were in the field, where the European was treated in his own bush tent or in the hospital tents of the field ambulances or local aid posts. There were some 3,000 Europeans employed on military duties with the various forces. Many of these men had over a dozen malarial attacks during the seventeen months of the campaign, while scarcely any escaped one attack. The 613 recorded in the Duala base hospital from among 1,514 European admissions do not present a true estimate of the local importance of the disease or its proportional incidence, which must have been considerably higher than 40 per cent. There were, however, few deaths from malaria or blackwater fever; only 13 and 5 respectively from among 2,410 cases of malaria and 11 cases of blackwater fever at Duala among all ranks of the western force. Prophylactic quinine was probably taken by all Europeans of the force. This was certainly the case with those



Operating Room, Base Hospital, Duala.

To face page 306.

Laboratory, Base Hospital, Duala.

To face page 301.

of the western column, where only 147 Europeans were invalided for malaria or anæmia following malaria.

Dysentery caused 1,850 admissions to the Duala hospital, of whom 100 were Europeans. There were 176 deaths from this disease, and 1,027 cases, of whom 47 were Europeans, were invalided. The disease was amœbic in type in 65 per cent. of the cases, the remaining cases being bacillary.

Pneumonia was very prevalent in the wet season especially among the carriers. On the advance to the higher plateau from the Cross river the great difference in temperature between night and day was regarded as the cause of much pneumonia amongst the carriers, who were not suitably clothed for this change of climate. From the figures obtainable from the western column there were 838 in-patients and 156 deaths from pneumonia, while 496 troops and carriers were invalided for this disease during the course of the campaign. Seventy-three were invalided on account of tubercle, though only 61 admissions are recorded in the returns. Other respiratory diseases gave numerous admissions chiefly from bronchitis, broncho-pneumonia, and pleurisy. Of the 24,261 analysed admissions 1,949 and of the 25,000 out-patients 2,407 were cases of these diseases, while 803 cases were invalided.

Rheumatism caused considerable wastage. More than 10 per cent. of the out-patients, 2,634 out of 25,000, and 1,138 of the in-patients being cases of rheumatism, while 375 were invalided.

Beri-beri occurred almost exclusively among the French, 329 of the 348 admissions to hospital for the disease and 311 out of the 315 invalided being amongst French troops. It was attributed to the use of Cochin China rice.

The 1,514 admissions of Europeans to hospital give no accurate idea of the European sick-rate as the vast majority of sick Europeans were treated in their quarters or in the bush hospitals, where reliable statistics were not obtainable. It may be said, however, that considering the prolonged and arduous nature of the campaign and the bad climate the Europeans of the western columns escaped lightly. Fifty per cent. of the admissions amongst them were due to malaria and anæmia, and of other preventable diseases dysentery caused only 100 admissions, and there were only six cases of typhoid fever amongst the 1,669 Europeans of the western force.

Amongst native troops and carriers, only 1,750 cases of dysentery and 1,797 cases of malaria are recorded in the analysis of in-patients, while there were no cases of typhoid, yellow fever, small-pox, or plague, diseases which were more or less prevalent at the time in the colonies bordering on or in communication with the Cameroons.

The invaliding rate was high among native carriers, but the carrier ceased to have the value of his upkeep when he could not undertake full work. For this reason locally engaged carriers were discharged when not up to work, and imported carriers invalided unless they were likely to recover sufficiently to carry loads of 60 lb. to 70 lb. in weight on the head for several hours a day and not break down under the strain. The high invaliding rate of the western column, therefore, was an expression of the military importance of avoiding the necessity of maintaining rations for useless or semi-useless men, rather than an index of their ill-health.

The number of killed, wounded and died of disease, noted as occurring amongst the forces with General Dobell, is as follows :—

	Killed.	Wounded.	Died of Disease.
Europeans (British)	24	30	6
Europeans (French)	26	50	19
Native soldiers (British)	193	557	84
Native soldiers (French)	232	571	99
Imported carriers (British)	26	31	309
Imported carriers (French)	12	33	163
Total	513	1,272	680

The casualties amongst General Aymerich's forces were stated to be 1,091, and in General Cunliffe's columns 700. These figures are, however, only approximately accurate.

It will be seen that amongst the combatant ranks the number killed was 475, as compared with only 208 deaths from disease. Amongst the carriers, 38 were killed and 472 died of disease. The ratio between the battle casualties and deaths from disease must be regarded as remarkable, when the duration of the campaign and the nature of the climate are taken into consideration.

The losses amongst the medical establishments were as follows :—

	Killed.	Wounded	Died of Disease.	Invalided
British medical officers	—	3	—	13
French medical officers	—	—	1	3
R.A.M.C. N.C.O.'s	—	2	—	3
French infirmiers	2	2	—	—
British native dressers	—	—	2	10

The only detailed record of the nature of the wounds is that of 535 serious cases of gunshot wounds admitted to the main

surgical ward of the Duala hospital between October, 1914, and February, 1916. The regional distribution of these wounds was as follows :—

Head and neck ..	47	of which	5	were	compound	fractures.
Upper limb	189	,,	70	,,	,,	,,
Thorax	40	,,	4	,,	,,	,,
Abdomen and pelvis ..	16	,,	5	,,	,,	,,
Lower limb	243	,,	51	,,	,,	,,
Total ..	535		135			

There were 38 deaths, five being due to inter-current dysentery or pneumonia. Ten deaths followed serious compound fractures of the femur, four of these dying shortly after admission to hospital. One death occurred from fracture of the fifth cervical vertebra, and three from serious gunshot wounds of the abdomen. There were seven cases of tetanus, all of whom had received anti-tetanus serum before or after the onset of the symptoms. Four of them died. The results obtained in the surgical ward were good, considering the serious nature of the wounds, which were inflicted by bullets usually at very close range, and often of large calibre or of the dum-dum type. Colonel Statham remarks that " these good results were not due to any of the later methods employed in Europe, but were obtained with the more commonly known antiseptics, chiefly cyllin and carbolic acid. The use of the continuous antiseptic bath was a great feature of the treatment, and was attended with happiest results." According to the reports of the X-ray laboratory at the Duala hospital, bullets of various calibre and structure had been used, from the military nickel bullet to soft-nosed and large lead bullets of old pattern police and sporting rifles.

CHAPTER XIX

THE MEDICAL SERVICES IN SOUTH AFRICA

BEFORE the outbreak of war there were two separate and distinct military medical services in South Africa: the medical services of the Imperial garrison represented by the R.A.M.C. under the War Office, and the South African Medical Corps which was in process of organization for the Union Defence Forces under the Minister of Defence. The officers and personnel of the latter, together with a South African military nursing service, were on a volunteer basis similar to that of the territorial force units in the United Kingdom; and, with the exception of those for the permanent Union troops, such as the South African Mounted Rifles, had not yet been completely organized for training, and were intended to be embodied only in time of war.

The Imperial medical services were under the administrative control of a D.D.M.S., Surgeon-General W. G. Bedford, the South African Medical Corps under a staff officer for medical services, Major P. G. Stock, who had formerly been an officer of the R.A.M.C. This dual factor dominated the medical arrangements in South Africa throughout the war period.

At the commencement of the war all the Imperial troops, with the exception of two companies of the R.G.A., a field company of the R.E., departmental details, and some details left to train the South African volunteer units, were withdrawn for service in Europe. The authorized establishment of the R.A.M.C. at the time was 24 officers, including quartermasters, and 162 other ranks. Surgeon-General Bedford and all of them except Lieut.-Colonel Seaton and Lieut.-Colonel Buist and about six other ranks R.A.M.C. left for Europe in September, and the military hospitals,* except those on the Cape Peninsula, were closed. Lieut.-Colonel Seaton then became senior medical officer of the Cape Peninsula garrison for a short time. He was succeeded by Lieut.-Col. Buist, who was given additional duties in connection with the organization and training of the Union Defence Force at its Cape Town base, with the temporary rank of colonel. There were left with him a staff-sergeant,

* There were five R.A.M.C. hospitals in South Africa at the time: Potchefstroom, Maritzburg, Roberts Heights near Pretoria, Tempe near Bloemfontein, and Wynberg on the Cape Peninsula.

a sergeant-dispenser, an X-ray laboratory orderly, and one or two of the clerical section R.A.M.C. Colonel Buist left South Africa at the beginning of November, 1915, and was succeeded by Major, afterwards Lieut.-Colonel, Wright, who had retired from the R.A.M.C. and had settled in civil practice at Simon's Town. Lieut.-Colonel Wright continued to hold administrative charge of the medical services for such Imperial purposes as were not undertaken by the Union Defence Force during the remainder of the war period.

Civil medical practitioners were engaged by Surgeon-General Bedford before he left, for the medical charge of details of Imperial troops and women and children who were unfit to travel or were detained up country after the departure of the expeditionary force, arrangements being made for the admission of military patients to civil hospitals in Pretoria and Maritzburg at a fixed charge of 10*s*. daily for adults and 5*s*. for children. The military hospitals on the Cape Peninsula consisted of a dieted hospital at Wynberg with 75 beds, and non-dieted hospitals in the Castle, Cape Town, with 16 beds, and at Simon's Bay with 18 beds.

The Imperial military command, so far as its medical services were concerned, was thus reduced to the status of a local garrison in the Cape Peninsula, with Lieut.-Colonel Seaton and afterwards Lieut.-Colonel Buist as senior medical officer, and with Major Wright as senior medical officer of the Simon's Bay defences.

According to the Cape defence scheme, the hospital accommodation at Wynberg was to be increased by 270 beds, or half a general hospital; the Castle hospital by 40, and Simon's Bay by 20 beds; but when mobilization took place it was not considered necessary to carry this out and the actual increase at that time was 20 beds at Wynberg and the Castle, and 10 beds at Simon's Bay. The equipment of half a general hospital was, however, maintained in mobilization stores at Wynberg and both it and the hospital itself were transferred on loan to the Union defence authorities, with a quartermaster-sergeant, wardmaster and steward clerk of the R.A.M.C. as the only R.A.M.C. personnel, the place of the R.A.M.C. personnel which had been withdrawn being taken by members of No. 1 Company of the South African Medical Corps, who were called up for service under the Defence Act. Its rank and file had been trained in elementary stretcher drill only, but had no experience of hospital or nursing duties. A training depôt was formed under Lieut.-Colonel Usmar, who had as his adjutant Lieutenant and Quartermaster Richardson, an ex-Q.M.S. of the R.A.M.C. Qualified nurses of the South African Military

Nursing Service supplemented the personnel of the No. 1 Company S.A.M.C., and the medical officers were highly qualified civil practitioners. The arrangements with the Union defence authorities were to the effect that the sick of Imperial troops would be treated in the military hospital at a fixed daily charge, that all medical personnel of the South African Medical Corps and South African Military Nursing Service in the Cape Peninsula were to be under the orders of the General Officer Commanding in South Africa and that communications on military medical matters were to be submitted to him through the senior medical officer of the Imperial service, who received the instructions of the Minister of Defence through his director of medical services.

When war was declared, the mobilization of an expeditionary force for operations against German South-West Africa was commenced. Cape Town was to be its main base, and mobilization camps were prepared at various places on the Cape Peninsula. The forces mobilized, however, were entirely Union forces and did not come under the command of the Imperial military authorities. But considerable work was thrown on the Imperial senior medical officer in connection with them. Large increases in hospital accommodation became necessary. The military hospital at Wynberg was expanded into a general hospital, a second general hospital was established at Maitland, a suburb of Cape Town, and a hospital transport, the "City of Athens," and a hospital ship, the "Ebani," organized. The latter was equipped under the directions of defence headquarters and the official advisory committee on voluntary aid, with additional comforts from the South African Red Cross Society. The personnel was obtained from the South African Medical Corps. On the termination of the German South-West African campaign the "Ebani" was transferred to the Imperial authorities, and was used as a hospital ship in various places. Those of its staff of South African Medical Corps who remained on board were transferred to the R.A.M.C.

Owing to the rebellion in South Africa at the end of 1914 the departure of a portion of the expeditionary force for operations against German South-West Africa was postponed. After its return in July and August, 1915, on the termination of the campaign, general demobilization took place. The general hospital at Wynberg was then rapidly reduced and reverted to its original status as a military hospital under the General Officer Commanding, and the medical services, under Lieut.-Colonel Buist, were concerned with ordinary routine medical and sanitary work in connection with the

Peninsula defence troops and with the medical examination of recruits for the South African contingent, which had been formed for service in Europe. Colonel Stock accompanied the contingent to Europe, nominally in command of a general hospital, but also as senior medical officer and subsequently as D.D.M.S. of the contingent.

The medical services at the Cape were not called upon for further expansion of their work during the war, until the War Office decided to organize a large expeditionary force from volunteers in South Africa for service in German East Africa. General Smith-Dorrien with his headquarters staff arrived in Cape Town early in January, 1916, to command the force. His D.M.S. was Surgeon-General D. G. Hunter, and it was decided by him in consultation with the G.O.C. of the Command to make the Cape Peninsula the hospital base, to which sick and wounded from East Africa should be evacuated. Durban had been under consideration for this purpose, but was then rejected because it was feared that its climate would be prejudicial to patients and convalescents returning from field operations in a tropical and unhealthy climate, although it was three days by sea nearer the base of operations. Subsequently, however, Durban became a large hospital centre. Two general hospitals were again organized, No. 1 in Wynberg Camp, which provided accommodation for 850 beds in huts and 400 under canvas, and No. 2 was again opened at Maitland, with accommodation for 1,100 and ample room for expansion by tentage. Owing to the mobilization of a general hospital for service in Europe and the demand for as many medical officers as possible from South Africa for service with the R.A.M.C., most of the experienced medical officers, nurses and subordinate medical personnel had left the Cape, and arrangements were consequently made with Colonel Knapp, who was acting as D.M.S. of the Union at Pretoria, to open recruiting amongst volunteers of the South African Medical Corps in order to provide the personnel for these two hospitals. He appointed Colonel Temple-Mursell, of the S.A.M.C., who was a Johannesburg consulting surgeon, to command No. 1, and Lieut.-Colonel McGregor to command No. 2 General Hospital.

As all the hospitals were staffed by officers and men enlisted in the South African Medical Corps they came under the control of the D.M.S. of the Union at Pretoria, who appointed the S.M.O. of the Imperial command to be his A.D.M.S. in the Cape Peninsula, so that the latter continued to administer the medical services there in a dual capacity.

The establishment of a general hospital, laid down in War Establishments, was followed as far as possible, but, owing

to the scarcity of experienced male nurses the number of nursing sisters was largely increased, and coloured labour was employed for menial general duties which the South African Medical Corps orderlies were not called upon to perform. There was an ample supply of qualified lady nurses in South Africa, and the acting Matron-in-Chief, Miss Nutt, who had retired from the Q.A.I.M.N.S. and had succeeded Mrs. Creagh of the S.A.M.N.S. when the latter left with the contingent for Europe, was able to select a number of extremely competent nurses. Cooks were drawn from the rank and file and placed under the control of a civilian chef. Indians were ultimately employed in their place.* The officer establishment consisted of the commanding officer, the adjutant, the quartermaster, and on an average 22 medical officers for general duty. Surgical and other specialists were also appointed to each hospital. Equipment was obtained partly from local resources and partly from the military medical and ordnance stores at the Cape, but, in anticipation of requirements, the War Office had been asked to send out the complete equipment of a general hospital.†

No. 1 General Hospital was ready in February, 1916, and a nucleus staff was then transferred from it to organize No. 2 General Hospital at Maitland. Evacuation of sick and wounded from German East Africa, however, did not commence to any great extent until January, 1917, and, consequently, there were not enough sick in the Cape Peninsula to fill No. 1 during 1916.

Apparently the necessity of maintaining, in these circumstances, the personnel for No. 2 General Hospital pending the arrival of convoys from East Africa was not realized, for after the question had been referred to the authorities in East Africa orders were issued on the 15th September, 1916, to close the hospital and disperse the personnel. A nucleus of the most experienced men was fortunately retained, and two months later orders to re-open the hospital for large convoys suddenly reported to be on their way from East Africa were received. Orderlies had again to be recruited, but in fewer numbers, as many of them had been replaced by lady probationers, a large number of whom had volunteered for duty and proved very satisfactory.

The medical examination of recruits of all classes, white

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* In October, 1916, lady cooks were appointed to release men of the S.A.M.C. for service overseas, but were only employed for a short time at Wynberg, although employed in other hospitals in South Africa.

† It arrived just in time to provide beds for a heavy convoy of sick and wounded which arrived in January, 1917.

and coloured, and for European as well as for East African theatres of war, was carried out continually from the formation of the East African Expeditionary Force until the Armistice. A recruiting medical board under the direction of Lieut.-Colonel J. Hewat, S.A.M.C., was established at Cape Town where all recruits from up country districts were re-examined. A special feature was recruiting for the Royal Air Force in 1917 and 1918 amongst the youth of South Africa. Examinations for this force were conducted at Cape Town and Johannesburg by officers specially appointed by the D.M.S. for the purpose. Other centres were also visited by a special medical officer on recruiting tours in 1917 and 1918. Four hundred were passed fit in 1917 and sent to England, and 1,274 in the second recruiting tour, of whom 1,024 went to England and 250 to Egypt. Two hundred and twenty-six more were waiting embarkation when the Armistice was signed.

Coloured and native recruits were enlisted into the South African Labour Corps in large numbers. They were obtained through the magistrates in native districts and mobilized in the Cape Peninsula, where a large camp was formed for them. There the men were equipped, medically examined, and inoculated against enteric and a large number also against pneumonia, before embarkation. Between 40,000 and 50,000, not including men of the Cape Labour Corps and Cape Horse Transport, were sent to England for duty in France and elsewhere from this mobilization camp. These were in addition to recruits examined for despatch to the East African Expeditionary Force, both as fighting troops and followers.

In January, 1917, hospital ships with sick and wounded from German East Africa commenced to arrive in South Africa and continued throughout the war to bring convoys to Cape Town and Durban, where they were distributed to other hospitals and convalescent camps organized by the Union Ministry of Defence in Natal and in the Transvaal both for white and coloured native troops.

The distribution of Union convalescents arriving in these convoys differed from that of the Imperial sick and wounded. The latter were transferred to the general hospitals on disembarkation, but the former as a rule, if repatriated on account of malaria, were dispersed to their homes throughout the Dominion owing to the shortage of hospital beds. The treatment of these men proved, as was to be expected, unsatisfactory. It became necessary to recall many of them and admit them to hospitals, and this led to a commission being appointed in July, 1917, by the Minister of Defence to report upon

the provision of hospital accommodation throughout the Union.

The A.D.M.S., Cape Peninsula, who, as noted, was S.M.O. of the Imperial troops, accompanied the commission. The Government accepted the report of the commission, which recommended that 11,000 beds should be provided in South Africa for the sick and wounded from East Africa, and that a hutted hospital should be constructed at Durban in place of the marquees, which appear to have rotted in the climate there within three months. Colonel P. G. Stock was recalled from France to undertake the necessary organization at the Imperial expense. There were at that time 6,390 hospital beds available in the Union, exclusive of 2,000 in a convalescent camp at Pretoria, but this accommodation was quite insufficient for the numbers returning from East Africa. The erection of the new hutted hospitals was proceeded with and such was the expedition used that most of the huts were ready for occupation when large numbers of sick and wounded arrived at the end of 1917. Consequently the system of sending malarial patients to their homes had not again to be adopted. A reorganization of the hospital accommodation then became possible and certain convalescent hospitals were practically closed down by May, 1918. The Union authorities referred the question of increase of hospital accommodation generally to the War Office, and the matter was left to the decision of Major-General Pike, A.M.S., who was to visit South Africa on completion of special duty in connection with the medical services in German East Africa. Major-General Pike held a conference on the subject at Cape Town on the 14th May, 1918. The hospital accommodation at the time was as follows :—

Designation.	Number of Equipped Beds.		Locality.	Remarks.
	White Troops.	Coloured Troops.		
No. 1 General Hospital ..	1,040	—	Wynberg, Cape Town	Capable of expansion to 1,600 under canvas.
No. 2 General Hospital ..	990	50	Maitland, Cape Town	Capable of additional expansion of 1,500 under canvas.
No. 3 General Hospital ..	520	—	Durban	Capable of expansion to 500 under canvas.
,, Section ..	100	—	Addington, Durban ..	20 beds for officers or sisters.
No. 4 General Hospital ..	1,485	30	Roberts Heights, Pretoria	35 beds for officers.
No. 6 General Hospital ..	553	24	Potchefstroom ..	21 beds for officers or sisters.
No. 7 General Hospital ..	100	140	Woodstock, Cape Peninsula	For venereal patients.
Fort Knokke Hospital ..	—	400	The Docks, Cape Town	A disused military hospital.
No. 1 Auxiliary Hospital..	130	—	Trovato, Cape Town..	Voluntary hospital.

Designation.	Number of Equipped Beds.		Locality.	Remarks.
	White Troops.	Coloured Troops.		
No. 2 Auxiliary Hospital..	20	—	Balgarthen,Cape Town	Voluntary hospital for officers.
No. 3 Auxiliary Hospital..	16	—	Waterloo House, Cape Town	Voluntary hospital.
No. 4 Auxiliary Hospital..	220	—	Newlands House, Cape Town	Voluntary hospital.
No. 8 Auxiliary Hospital..	25	—	La Belle Alliance,Cape Town	Voluntary hospital for officers.
Congella V.A.D. Hospital	38	—	Durban	St. John V.A.D.
Kings House Auxiliary Hospital	50	—	Durban	For officers or sisters.
Caister House Auxiliary Hospital	73	—	Durban	Red Cross hospital.
Grassmere Auxiliary Hospital	17		Durban	For officers or sisters.
Stationary Hospital ..	200	—	Epsom Road, Durban.	
Jacob's Hospital	—	500	Durban.	
Epidemic Hospital ..	150	—	Durban	Quarantine hospital.
Tempe Hospital	204	—	Bloemfontein	Capable of expansion to 1,000 under canvas.
Wanderers Hospital ..	200	—	Johannesburg.. ..	12 beds for officers.
Civil Hospital	122	—	Maritzburg.	
Civil Hospital	19	32	Kimberley.	
Combined Cape Corps Hospital	—	421	Kimberley.	
No. 1 Convalescent Camp	2,045	—	Roberts Height Pretoria	45 beds for officers.
No. 2 Convalescent Camp	430	—	Maritzburg.	
No. 3 Convalescent Camp	425	—	Durban.	
Jacobs Convalescent Camp	—	1,500	Durban.	
Combined Cape Corps Convalescent Camp	—	510	Kimberley.	
Total	9,154	3,207		

Any further increase of hospital accommodation was considered unnecessary, and, on Colonel Stock's recommendation, in order to set free medical personnel for service elsewhere, Major-General Pike agreed on behalf of the War Office to considerable reductions in the existing accommodation. The convalescent camp at Roberts Heights, Pretoria, for example, could be reduced from 2,000 to 600 beds, the native convalescent camp at Jacobs, Durban, from 1,500 to 500, No. 6 General Hospital at Potchefstroom from 600 to 300, the native hospital at Jacobs from 500 to 300. Some other minor reductions were also sanctioned.

The approximate number of sick and wounded treated in the general hospitals of the Cape Peninsula during the war period, exclusive of large numbers treated in convalescent camps and depôts, was 60,000, of whom the majority were troops from East Africa and other theatres of war. The number treated in other hospitals of the Union was some 60,000 more. The D.M.S. of the Union always consulted the Imperial authorities regarding the disposal of sick and wounded of the Imperial Forces, who contributed a considerable percentage of these admissions.

Upwards of 750,000 troops on transports and other vessels are estimated to have called at or embarked at South African ports during the war. The medical services were concerned in dealing with the medical and sanitary arrangements connected with them. Owing to the shortage of shipping, which began to be experienced in January, 1916, in embarking troops for the United Kingdom at Cape Town, much difficulty was experienced in arranging for suitable hospital and other sanitary conditions on board. Comfort had to be sacrificed in order to transport the maximum number. The necessity of darkening the ships during the night interfered with ventilation, a matter of much importance in passing through the tropics. In order, however, to maintain suitable hospital accommodation on board, especially in the event of infectious diseases occurring, it was the practice at Cape Town to disembark all sick before the ships sailed. Thus 146 cases of measles and mumps were landed in December, 1916, from the "Suevic," which arrived with troops from Australia. The hospital accommodation allowed in transports was 3 per cent. of the troops on board. This was found inadequate for transports conveying troops returning from service in East Africa and, for them, hospital accommodation was increased and the numbers carried reduced by disembarking some of the men. Altogether 1,000 patients were landed from transports touching at Cape Town between October, 1916, and the date of the Armistice.

In addition to the sick and wounded landed from hospital ships plying between German East Africa and the Cape base, many were also transferred from Mesopotamia and India to the Cape, because of certain military advantages in using a base in South Africa for sick and wounded from these theatres of war. As there was no regular service of hospital ships between South Africa and England many of these patients were kept for a considerable time in the Cape Town hospitals. Consequently there were periods after the hospitals had been reduced when they became congested, but the difficulty was met by the transfer of convalescents to England by ordinary transports. On these occasions additional hospital accommodation was arranged on board the transports and female nurses were added to the hospital staff in many cases. The Australian and New Zealand hospital ships returning empty to England were also most useful in relieving the Cape Town hospitals of sick and wounded waiting trans-shipment.

The sick and wounded who arrived from East Africa were generally in a very debilitated condition owing to recurrent

attacks of malaria followed by anæmia and cardiac complications. The climatic conditions and abundance of food, fresh fruit and vegetables obtainable at Cape Town caused rapid improvement in their health.

Outbreaks of infectious disease were of an insignificant character amongst the troops in the Cape peninsula until the end of September, 1918, when an epidemic of influenza, "declared to be the most sudden, severe and malignant pestilence ever experienced in the country, fell upon the Union of South Africa and was the cause of many thousands of deaths." The garrison of the Cape Peninsula suffered equally with the general public. The first cases were mild, but as the epidemic progressed there was an increasing tendency to fatal complications. 1,323 European soldiers were admitted to hospitals from the garrison of the peninsula, and 20 from transports; 91 died. There were also 351 admissions and 7 deaths amongst coloured troops, in addition to many serious cases amongst the families of the garrison. Vaccine inoculation was given a trial, and although no exact conclusion was reached as to its value the disease appears to have been modified and the incidence and severity of lung complications lessened. Several of the local civil authorities applied to the military medical authorities for assistance during the epidemic. Hospitals under canvas were organized for them by Colonel Hewat, the A.D.M.S., and medical officers were appointed to visit them daily.

An interesting incident in connection with this disastrous epidemic is that during it the Japanese cruiser "Nukata" was in Simon's Bay and afterwards in Table Bay, but entirely escaped infection. The preventive measures carried out by the Japanese were of a drastic character and included stoppage of shore leave or of visitors from shore, the wearing of masks by men necessarily sent to shore on duty, disinfection of everything taken on board, and inoculation with anti-influenza vaccine. Vegetables from the shore were washed and exposed to sunshine, bread was exposed to heat in kitchen ovens, meat and fish were exposed to the air and the covers on them changed on the pier, newspapers and letters were sprayed with formalin and dried in the sun; men returning from shore duty gargled with 1 in 10,000 solution of corrosive sublimate and cleaned their clothing and boots with a 3 per cent. solution of carbolic acid on the pier before going on board. They were given formalin "tabloids" to use on shore, and instructed to avoid crowds. The crew gargled with salt after every meal and with corrosive sublimate or boracic acid before turning in. Temperatures were taken every day and any signs of

inflammation of naso-pharyngeal passages searched for and the cases isolated. All table dishes were boiled after use, and, at the height of the epidemic on shore, provisions from town were stopped and only tinned meat and fruits used.

Cerebro-spinal meningitis occurred on Australian and other transports calling at Cape Town and caused considerable anxiety, as no case had occurred amongst the civil population for many years. Major Douglas Pullon, S.A.M.C., was appointed to carry out investigations at the Government bacteriological laboratory, under Lieut.-Colonel Robertson, the Government bacteriologist. On any suspicious case being reported he visited the ship, had suspected cases removed to the city infectious hospital, and examined the men on board in order to detect carriers. All this work was carried out under difficult conditions, but the bacteriological reports were of great value to the military medical administration. Close contacts of cases were segregated until the bacteriological report on them was received, and those found to be positive carriers were removed to the infectious hospital and detained until at least two negative swabs were obtained. Eight hundred and forty-four contacts were examined and 74 found positive. In addition, 310 non-contacts with catarrhal conditions of the throat were also examined* and six found positive.

The number of cases of the disease occurring on transports before their arrival at Cape Town was 126 between June, 1916, and October, 1917. Of these, 51 acute cases were treated in Cape Town; others of the 126, who had not died at sea, had been landed at Durban. Three convalescent cases and ten suspected cases, which did not, however, develop the disease, were also landed at Cape Town. Eighty-two carriers were isolated and treated in the city infectious hospltal, their average stay being thirty-seven days before they became bacteriologically free. The precautions adopted proved effective and prevented the introduction of the disease amongst the garrison and civil population.

In March, 1917, the Union Government agreed to pay the whole cost of the hospitals in the Cape peninsula, including the cost of treatment of Imperial sick and wounded in them; and in consequence of this the D.M.S. of the Union appointed Union medical officers as A.D.sM.S. of the peninsula and Durban, Colonel J. Hewat being appointed to the former post and Lieut.-Colonel Whitestone to the latter. Lieut.-Colonel Wright,

* This was done at the instance of the civil Medical Officer of Health. The result of the examination of non-contacts was transmitted by wireless telegraphy to the ships, should the ship have sailed before the examination was completed.

R.A.M.C., who had up to this time acted in the dual capacity of A.D.M.S. under the Union D.M.S. and S.M.O for Imperial troops, was thus relieved of responsibility regarding the administration of the hospitals, but not as regards the disposal of the Imperial sick and wounded in them. He also retained responsibility for all duties connected with transports. It was accordingly necessary to define clearly the duties of the S.M.O. responsible to the General Officer Commanding the garrison and to the War Office, as distinct from those of the A.D.M.S. responsible to the D.M.S. and Union Minister of Defence.

Much assistance was given to the medical authorities by voluntary workers. A committee was formed on the outbreak of war at Cape Town to raise funds for the provision of certain auxiliary convalescent hospitals in the peninsula both for officers and men. It was this committee which chartered the "Ebani" and converted it into a hospital ship for service in German South-West Africa. Two large private houses, capable of accommodating 90 patients each, were taken over as auxiliary hospitals, and other convalescent homes opened. The expenses of these were met by public subscriptions. They were placed under the command of Colonel Stanford; military medical officers took medical charge of the patients. The Cape of Good Hope Red Cross Society also raised funds to supply comforts to troops proceeding on active service, to hospital ships, transports carrying invalids from Cape Town, and to military hospitals in the field during the South-West African and East African campaigns; for the establishment of the South African hospital at Richmond, for South African medical units in France, and for other theatres of war.*

The S.M.O. of the Imperial Services recorded certain points of administrative importance as the result of his experience in the dual capacity of responsibility to the G.O.C. of the Imperial command and to the D.M.S. of the Defence Ministry of the Union. He considered that there should be in similar circumstances an Imperial military hospital directly under R.A.M.C. administration and staffed by R.A.M.C. personnel, although it should be noted that such personnel was not available; that there should be a military infectious diseases hospital for the reception of infectious cases from transports, as well as from the garrisons; that the hospital accommodation on transports on long voyages should be increased, and encroachments on deck space reduced; and that the Union regulations affecting the administration of military hospitals

* A Cape coloured corps formed part of General Allenby's force in Palestine. It was accompanied by a medical personnel from the South African Medical Corps.

should be more in agreement with the general principles laid down in Army Medical Service Regulations. He also raised a point of interest in connection with European troops serving in a tropical campaign. He found that the average percentage of men returned to duty in German East Africa after being invalided to the Cape was 60 per cent. amongst those who had been in East Africa for one year only, 40 per cent. of those who had been there from one to two years, and 12 per cent. of those who had been over two years. From this he concluded that European troops should not be kept on active service in tropical climates for more than eighteen months without relief.

The general sanitary work at the base was carried out by sanitary inspectors in association with the civil medical officers of health and Defence Force officers appointed for sanitary duties from time to time. Colonel Buist during the time he was senior medical officer noted the exceptionally small amount of sickness amongst those returning from the German South-West African campaign. The hospital ship "Ebani" which was equipped for 300 or 400 beds generally came back only partially filled. He considered that the comparative immunity of the troops was attributable to a great extent to the generous use of arsenite of soda, which was used as a solution for the destruction of flies and sprayed round kitchens, animal kraals and horse lines. In the Cape Peninsula, branches of eucalyptus or other trees with large leaves were hung in every tent, cookhouse, and latrine, and sprayed twice weekly with the solution. In kraals and horse lines it was sprayed over the ground with a watering-can. The solution was composed of 5 lb. arsenite of soda, 5 lb. of sugar and 10 gallons water, and coloured with cochineal. Its value in removing flies was specially observed in the camps at Lüderitzbucht, the base in South-West Africa, where weather conditions and innumerable horse lines were favourable to their prevalence. Yet they were remarkably absent from tents, cookhouses, latrines, and camps generally at the time Colonel Buist visited the base in company with Lord Buxton, the Governor-General, and with the General Officer Commanding at Cape Town.*

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* See Chapter XXI, p. 346.

CHAPTER XX

THE MEDICAL SERVICES DURING THE OPERATIONS IN SOUTH-WEST AFRICA

GENERAL NARRATIVE

THE formation of the defence forces of the Union of South Africa had been authorized by an Act of the Union Parliament only in 1912, and time had not permitted of the organization of an effective medical corps, with officers, non-commissioned officers and men trained for active service, when the war broke out in August, 1914.

A training school was in process of formation in connection with the only existing military hospital of the Union, under the command of Lieut.-Colonel G. H. Knapp, at the military schools at Tempé, Bloemfontein. An officer from the R.A.M.C., Captain B. A. Odlum, had been seconded to act as chief instructor, but the first classes were to have been held only in September, 1914, when four medical officers who had been appointed to the permanent force staff were expected back from England, where they had been sent for training at the R.A.M.C. College and Depôt.

Citizen Force medical officers had also been appointed as assistant directors of medical services in ten military districts, and a small staff of non-commissioned officer instructors had been engaged ; but no mobilization plans had been prepared, and beyond a small amount for instructional purposes there was practically no medical equipment in store.

The directing staff for medical services at Defence Headquarters consisted of a staff officer, Major P. G. Stock, who was responsible to the Minister for Defence, a quartermaster for dealing with medical stores, Captain Cope, and a military clerk, Mr. Jones.* Shortly after the outbreak of war Major Stock was appointed Director of Medical Services and promoted to the rank of lieutenant-colonel and subsequently to that of colonel.

When the news was received in Pretoria that war had been declared, the South African Government accepted responsibility for the defence of the Union in order to free the Imperial

* Afterwards Captain Jones, S.A.M.C.

regular troops then stationed in South Africa for service in Europe. They also agreed, at the request of the Imperial Government, to send an expedition against German South-West Africa, the naval part being undertaken by the Imperial authorities and the military operations by the Union Government.

These decisions threw a great responsibility and strain on Major Stock and the small staff at Defence Headquarters, particularly as owing to the rapidity of mobilization nearly every available medical officer with any military experience had immediately to be sent into the field. Personnel had to be found, equipment obtained, and organizations hurriedly built up and expanded to meet the pressing needs.

By the end of August, 1914, practically the whole of the Imperial garrison had sailed, with the exception of two companies of the R.G.A., a field company of the R.E., and a few details in the Cape Peninsula. Amongst the latter Lieut.-Colonel Buist and about half-a-dozen other ranks of the R.A.M.C. had been specially retained, and during the campaign, as noted in the previous chapter, Lieut.-Colonel Buist acted as senior medical officer in the Cape Peninsula.

On September 9th, 1914, the Union Parliament met in Extraordinary Session, and the action of the Government respecting hostilities in German South-West Africa was confirmed by both the Senate and the House of Assembly.

A short summary of the more important physical characteristics of the country in which the campaign was to be conducted will enable an appreciation to be made of the conditions with which the medical services, as well as all other troops, had to contend.

The portion of the African continent then known as German South-West Africa covers more than 322,000 square miles and is situated between 11° and 26° east longitude and 17° 16″ and 29° south latitude.

Portuguese Angola adjoins it on the north, the boundary being briefly the Cunene and Okavengo rivers. On the south, the northern bank of the Orange River forms the boundary with the Union of South Africa. The eastern boundary traverses the Kalahari Desert and follows the 20th degree east longitude until it meets the 22nd degree south latitude, along which it runs until the 21st degree east longitude is met. From this point northwards it follows the 21st degree east longitude, free access to the Zambesi being given by a strip of territory 20 miles wide.

On the west is the South Atlantic ocean, but as the moisture

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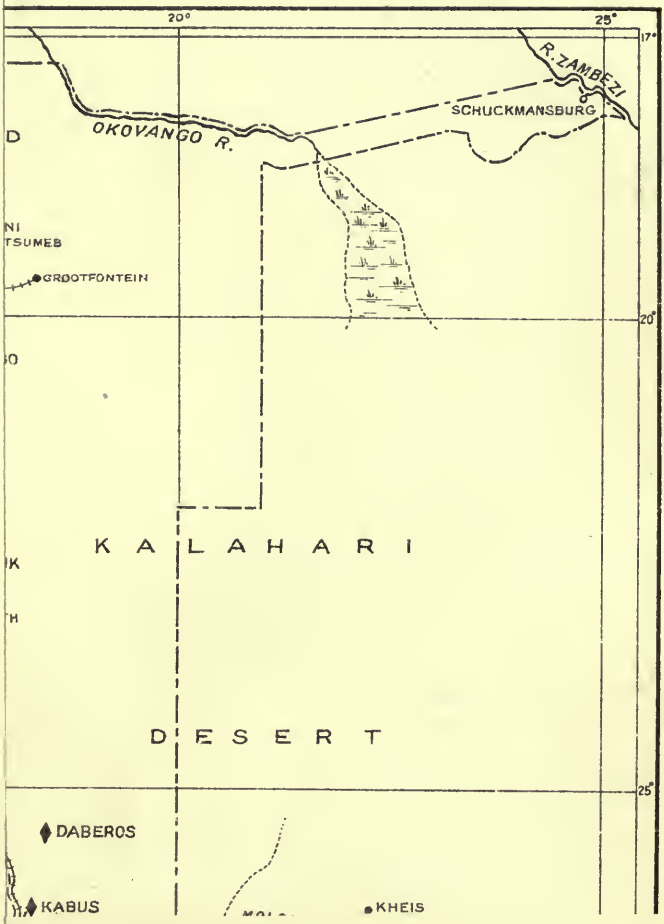
EVACUATION.



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laden winds from the sea only precipitate rain when they strike the mountains inland, there is an intervening strip of burning waterless desert, covered near the sea with moving sand-dunes. These are succeeded farther inland by a hard, barren surface, which in turn gives place to the ravines of numerous watercourses, whose hidden waters make a few small oases at the foot of the hills but never reach the sea. Except where crossed by the valley of the Swakop River and the southern railway to Lüderitzbucht, this desert strip presents a practically insuperable obstacle to the movement of troops.

Strong winds from the west and south are frequent, raising a heavy sea and dangerous surf on the shore. The only harbours which could be utilized for military purposes were Lüderitzbucht, Swakopmund, and Walfish Bay, the last a British possession, the entrance to which is about 12 miles south of Swakopmund.

Lüderitzbucht had a well-sheltered harbour, but no facilities existed for discharging vessels direct on to a quay. The port was entirely dependent for its water supply on condensers, but these were destroyed before the troops landed.

Swakopmund, as a port, had little more than an open anchorage. The town covered nearly a square mile on the sandy shore north of the mouth of the brackish Swakop River, and was the terminus of the railway system which linked up the north and south of the country, and, like the terminus at Lüderitzbucht, connected them with the sea. Walfish Bay had an excellent harbour with a well-sheltered anchorage, but the only water supply was obtained from brackish wells 4 miles distant, and the only landing facility was a small jetty. The surrounding country for miles and miles presented the appearance of unutterable desolation.

In the interior, the country rises to a height of 3,000 or 4,000 ft. Windhuk, the capital, is over 5,000 ft. above sea-level, and the Auas Mountains, immediately to the south, about 2,000 higher.

Near the coast, and as far inland as the foothills of the central plateaux, the climate is very dry, though heavy fogs occur close to the sea. The rainfall varies considerably, but the country is poorly watered and the majority of the rivers, except in the height of the rainy season, flow underground.

The water supplies are usually obtained from wells, but in the coastal belt, except at Swakopmund, distillation of sea-water has to be resorted to. The deficiency of water was found, as had been anticipated, the chief difficulty in the movement of troops.

The range of temperature is very great, but while high temperatures are recorded by day, the nights are usually more or less cool.

The roads through the country can only be described as well-defined "tracks," and, though much of their surface was hard and good, it was always found that there were long, difficult stretches of heavy sand, rocks, or steep gradients. After rains large areas of the country become covered with grass. There is little forest, but in the interior a good deal of "park-like" open bush country is found covered with acacias and jungle thorn.

The original plan of campaign for the military operations was for four columns, known as Forces A, B, C and D, to enter German territory simultaneously via Nakab, Raman's Drift, Lüderitzbucht and Swakopmund. Lüderitzbucht and Swakopmund have already been described. Raman's Drift is on the Orange River, but owing to the difficulties of reaching it overland it was decided that the column advancing by it should first proceed by sea to Port Nolloth.

A considerable amount of shipping had to be arranged for, but by the 2nd September the force which was to operate via Raman's Drift was able to sail. Its departure was hastened by the news that the Germans had commenced hostilities. A strong patrol of the German colonial forces crossed the border at Nakab and entrenched in Union territory about the 18th August, and on the 22nd August a skirmish occurred at Schuit Drift between a part of this patrol and some Afrikander refugees, who were escaping into Union territory.

Force "A," which had sailed from Cape Town on the 2nd September and had landed under considerable difficulties at Port Nolloth and reached Sandfontein beyond Raman's Drift on the 25th September, was unable to make material progress against the enemy, and after suffering severe casualties was withdrawn. It had been accompanied by the Mounted Brigade Field Ambulance of the South African Mounted Rifles, with Lieut.-Colonel G. H. Knapp as its senior medical officer. No. 9 Mounted Brigade Field Ambulance was sent to it from Cape Town on the 29th September, but was unable to land at Port Nolloth until the 13th October on account of severe weather. It proceeded inland and was temporarily employed on hospital duties at Steinkopf, a station 61 miles from the coast, connected with it by a narrow gauge railway, and about 45 miles from Raman's Drift across a waterless desert. At Steinkopf the chief difficulty was the high temperature, which reached 110° F. in the shade, and was in marked contrast with

the wet and cold weather at the Cape when the unit embarked. On the withdrawal of the force, No. 9 Mounted Brigade Field Ambulance proceeded overland for duty in Bloemfontein, and the small hospitals which had been established at Steinkopf, O'okiep and Port Nolloth were closed, the casualties and remainder of the medical personnel being transferred by sea from Port Nolloth to Cape Town.

Force " B " operations from Upington did not materialize and it was partly on this account that Force " A " had to be withdrawn for the time being.

Force " C," which was intended in the first instance to capture Lüderitzbucht, landed without opposition, as the Germans surrendered the town on the 18th September after destroying the water condensers. The " Monarch," however, had been specially selected as a transport for this expedition because it was fitted with condensers capable of condensing 13,000 gallons of water a day, in addition to the 750,000 gallons of fresh water carried in its tanks, and by this means water continued to be supplied.

There was a well-equipped German hospital on Shark Island which was at once taken over by the medical services, and subsequently two other hospitals were opened in Lüderitzbucht, one in the drill hall and the other in the Europäischer Hof. The hotel buildings proved unsuitable and were closed, extensions being made to the drill hall and the hospital on Shark Island. Afterwards these various sections were grouped together as No. 4 General Hospital.

Skirmishing occurred on the outskirts of the town, but when the enemy retired to Garub and later to Aus, the question of repairing the railway line and obtaining sufficient supplies of water to enable the troops to cross the desert belt became the most pressing problem. Force " C," however, ceased to exist as a separate command on October 3rd, when Brigadier-General Sir Duncan Mackenzie arrived with Force " D," which, instead of proceeding as originally intended to Walfish Bay, had been diverted to Lüderitzbucht, having sailed from Cape Town on the 30th September. The two forces " C " and " D " were then amalgamated and were designated the " Central " force. Lieut.-Colonel Odlum and Major G. D. Maynard had been appointed A.D.M.S. and D.A.D.M.S. of the force respectively and accompanied General Mackenzie. They were transferred, however, to the administrative medical charge of a new force, the Northern Force, which was organized in December to proceed to Walfish Bay. Their places with the Central Force were then taken by Lieut.-Colonel G. H. Knapp and Major L. G. Haydon.

The Central Force at Lüderitzbucht was thus the only column in German South-West Africa until the end of 1914, and, until new forces for an advance from the south and east, and a Northern force could be organized, its operations were confined to preparing for its subsequent advance across the desert from Lüderitzbucht.

The most pressing question was the provision of water and conveying it to the troops, who suffered much from the heat and terrible sand-storms, on the outskirts of the town. Additional condensing plant was erected and a large reservoir built, but until these works could be completed the troops were dependent on water brought on shore from the transports. It soon became obvious, however, that animal transport was useless owing to the heavy sand, and that an advance across the desert could only be made by reconstructing the railway which the enemy had destroyed as he retired.

Directly material could be sent up from Cape Town the work of repairing the railway line was pushed forward and protecting blockhouses constructed. Progress at first was slow, but quickened up when a Railway Pioneer Regiment was organized and trained men became available. In the first section of the line the constantly shifting sand-dunes caused great difficulties, but were eventually overcome by pegging down matting over large areas of the dunes.

The country in the vicinity had continually to be patrolled, but by the 15th December the force had advanced to and occupied Tschaukaib. At Tschaukaib the dust and heat were worse than anything so far experienced. The sand-storms were terrific and during the day the temperature in the bell-tents, which were the only shelter available, frequently reached 127° F. The Central Force troops remained at Tschaukaib until the 19th February, 1915, and from their position could see the mountains at Aus where the Germans were strongly entrenched, with ample supplies of water behind them. A field hospital was opened at Tschaukaib by two sections of No. 1 Field Ambulance, but in spite of the heat and the dust the admission-rate for sickness was low. Together with the rest of the camp this hospital was constantly bombed by enemy aeroplanes, against which there was then no effective reply. Little damage was done, and on the whole the diversion helped to maintain the spirit of the troops. As the general conditions, however, were most trying, units in turn were sent to the coast for a short rest at Lüderitzbucht. There the temperature was much lower, the men were able to bathe, and the change did much to maintain their health.

Any advance from Tschaukaib to Aus necessitated a

SAND DUNES. SOUTH-WEST AFRICA.

INFANTRY ADVANCING OVER THE DESERT NEAR POMONA, LÜDERITZBUCHT.

To face page 328.

sufficient supply of water being carried for man and beast. Moreover if, when an advance took place, the troops failed to carry the position, sufficient water had to be available for the retreat; and it was not until the middle of February, 1915, that anything more than a reconnaissance beyond Tschaukaib could be attempted. By that time the Northern Force which was to operate from Walfish Bay had occupied Swakopmund, and a Southern and an Eastern Force were advancing from the Orange River and across the Kalahari desert.

On the 22nd February, 1915, Garub was occupied by the Central Force and the advance to Aus assured. The great difficulty had been to obtain a water base forward, and although water-boring had been carried out at Tschaukaib and halfway between it and Lüderitzbucht the results were unsatisfactory. At Garub, however, a good supply of water was at once obtained, and three days after the position was occupied drinking water from the bore-holes was available.

Tschaukaib had been hot, but Garub was hotter, and during the day the temperature in the bell-tents was seldom below 137° F. Sun-stroke, however, was practically unknown. The favourite order of dress was a helmet with boots and socks. A field hospital was opened at Garub by a section of No. 1 Field Ambulance; other field ambulances were held in reserve for the subsequent advance to Aus, the first position which the Germans held in force across the desert belt.

On the 30th March the advance took place. In the meantime the Eastern Force had arrived at Rietfontein and the Northern Force had attacked and captured Riet. Probably in consequence of these movements the enemy had been unable to continue his concentration, and Aus was found to have been evacuated. The wells, however, had been poisoned, and the troops suffered severely from thirst; but the situation was relieved by the arrival of Corporal Hippert, of No. 1 Field Ambulance, with 17 water-carts which he had volunteered to bring through the extensive but unmarked mine-field in front of Aus. By the 22nd April railway communication between Lüderitzbucht and Aus was open. Previously Garub had been the farthest point reached by train. The desert belt had now been crossed, and water and grazing and also rough roads for the passage of transport became available.

By the 14th April the mounted troops were concentrated at and in the vicinity of Aus, and the advance of the Central Force then entered on a new phase. Hitherto the work had been essentially performed by the infantry, but after the capture of Aus the mounted troops took the lead. A flying

column was formed, No. 5 Mounted Brigade Field Ambulance being attached to it. The column advanced by Kuibis to Bethany and Beersheba, 150 miles from Aus, being in touch with the enemy from time to time during the march.

On the 24th April General Mackenzie moved out of Beersheba and eventually came up with the main force of the enemy at Gibeon. An engagement was fought on the morning of the 27th April; a number of prisoners and considerable stores were captured and the German Southern Force was finally defeated and put to flight. To move the wounded was impossible, and Colonel Knapp hastily improvised a hospital in Gibeon. Four or five days after the column had left Aus a wireless message had been sent back to No. 1 Field Ambulance to follow with as much equipment as possible. Major Pratt Johnson with two officers and 70 non-commissioned officers and men at once started. Their transport consisted of a number of water-carts, seven ambulance wagons, ten general service wagons and several Scotch carts with equipment and stores. On one occasion the mules could not be watered for thirty hours, but they reached Gibeon in seven and a half days. Some of the personnel were employed in the hospital at Gibeon, and as soon as possible nurses and other personnel were brought up. Later, when they were able to travel, the casualties were evacuated to Keetmanshoop, then to Lüderitzbucht, and finally sent down by hospital ship to Cape Town.

The force known as the Southern Force concentrated in the north-west district of Cape Colony under Colonel J. van Deventer, with Lieut.-Col. A. B. Hinde, a retired officer of the R.A.M.C., as his A.D.M.S. Raman's Drift was occupied by troops of the left wing of the force on the 12th January, 1915, but on the 24th January the enemy attacked the right wing at Upington and in the fighting which ensued a section of No. 1 Mounted Brigade Field Ambulance did particularly efficient work in attending to the wounded. On the 3rd February the left wing was engaged against the German advance posts near Sandfontein, and early in March Nabas was taken by the troops advancing on the right under Colonel van Deventer. No. 1 M.B.F.A. had been attached to this column and a fifty-bedded field hospital was opened in some buildings at Ukamas, some 10 miles east of Nabas. The ambulance eventually moved to Kalkfontein and its personnel, who had been employed in the hospital at Ukamas, was replaced by other medical officers and personnel and a few nursing sisters. The mountainous nature of the country between Kalkfontein and Keetmanshoop, known as the Karas ranges, rendered the further advance

of the Southern Force difficult. Colonel van Deventer had pushed forward direct to Kalkfontein and his left column pushed up from Raman's Drift. Kalkfontein became the temporary headquarters of the Southern Force on the 5th April, and on the 11th April General Smuts, the Union Minister of Defence, arrived. The Central, Southern, and Eastern Forces were then grouped under his command as a Southern Army.

Kalkfontein was the rail-head of the German military system in the south, but until railway connection could be established with Lüderitzbucht and rolling stock became available, casualties had to be evacuated by ambulance wagons and empty supply wagons through Ukamas, Nakab, and Langklip to Malopo, to which railway communication from Upington had been extended. Seeheim, which was the junction of the railway line from Kalkfontein with the line from Keetmanshoop to Lüderitzbucht, was entered on the 19th April, and Keetmanshoop was formally surrendered by the Burgomaster to the Union Forces on the 20th April.

The greatest difficulties in this advance of the Southern Force were in connection with water supplies and transport. As the enemy retired he destroyed the wells and poisoned the water, and no railway then existed. In September, 1914, the rail-head of the line from De Aar in Cape Colony had only reached Prieska, but it was quickly advanced to Upington on the Orange River, although supplies for Upington, which lay on the right bank, had to be ferried across. Owing to heavy rains the river soon became more than a mile wide, and a temporary bridge was built. After the country had been cleared of the enemy, the line was carried through to Kalkfontein and thus joined up with the coast at Lüderitzbucht through Seeheim.

The evacuation of the sick presented a serious problem, and casualties had often to be carried forward in the ambulance wagons attached to units. Hospitals had been opened at Prieska and De Aar and wounded and sick were brought down to them by ambulance train. As soon as possible, however, the medical base was advanced to Upington, where a temporary hospital was opened until it was replaced by No. 7 Stationary Hospital. After the Southern Force had reached Kalkfontein a clearing hospital was established at Kanus on the southern slopes of the Karas range and on the line of railway north-west of Kalkfontein.

The Eastern Force was mobilized on the 4th January, 1915, under the command of Colonel C. L. A. Berrangé, with Lieut.-Colonel J. Mackenzie as A.D.M.S. It was accompanied by No. 10 Mounted Brigade Field Ambulance, an improvised

hospital unit, a water-boring party, and other details. It concentrated at Kuruman. Kheis on the Molopo River was occupied as a protection against a flank attack. The advance into the enemy's country had to be carried out across the Kalahari desert. Scouts, mounted on camels, were watching the border near Rietfontein and some skirmishing occurred at Witkrans early in February. Water-boring parties had been pushed forward as far as Witkrans but the enemy obliged the advance section to retire and destroyed the wells.

The main column left Kuruman on the 6th March and for the greater part of 600 miles they marched through desert. A troop of Kalahari Horse pushed across some 111 miles of waterless country. The remainder of the column moved forward a squadron at a time owing to the shortage of water.

On the 15th April the Force reached Kirüs West after skirmishes at Rietfontein and Hasuur and pushed on and captured Kabus, which Colonel Berrangé occupied with the whole of his column on the evening of the 20th April. After the occupation of Kabus the advance was continued to Daberos, which was captured on the 28th April, and the Force rested for the first time since leaving Kimberley.

The Eastern Force, as such, subsequently took no further part in the campaign. Its operations, as may be surmised from the nature of the country, had been carried on under conditions of exceptional difficulty. The physique of the men was good, and they stood the hardships of thirst, short rations, and continuous marching well. Beyond an outbreak of measles at Kimberley and Kuruman there was practically no sickness. Transport was mainly by oxen and ox-wagons. Where water was not available the oxen existed on *tsama*, a desert melon on which the few natives found in the country have frequently to rely.

The water-boring sections succeeded in opening up water in wells and bore-holes and erecting storage tanks, without which the force could never have penetrated the desert. The 111 miles of dry belt were crossed by utilizing motor cars to carry a supply of water forward for 40 miles, and establishing a second depot 41 miles farther west which the cars supplied from Witkrans.

Fortunately some heavy rains fell in Cape Colony and caused a fall in temperature, but the great heat at first, followed by cold, windy weather, was trying both to men and animals.

Generally speaking, the country traversed was comparatively flat. In parts the sandy soil carried a little grazing; some bush and a few trees were found in the vicinity of river-beds and at rare intervals a water-hole. A few scattered kopjes,

MOTOR CAR EMERGING FROM THE BED OF THE GREAT FISH RIVER.

A WATER-HOLE IN THE DESERT.

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WARD ON HOSPITAL SHIP "EBANI."

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miles of sand-dunes, some large pans—generally dry and salt—extending over miles, with the intervening country covered with pebbly stones and sand, complete the picture. Reptiles were numerous. Several men were injured by scorpions and several horses and oxen killed by snakes.

The organization of the medical services presented many difficulties, and Major Egerton Brown, the D.D.M.S., was sent from Defence Headquarters to confer with Colonel Berrangé and his A.D.M.S. regarding the arrangements, and to inspect the line of route as far as possible. No. 10 M.B.F.A. was reorganized and a special hospital unit formed. Hospital accommodation was arranged at Kimberley, chiefly at the Kimberley Hospital, and a fifty-bedded hospital, expanded by tentage, was established at Kuruman in the buildings of the Moffat Institution.

When the column moved out of Kuruman a small field hospital was opened at Mopeppa. As the troops advanced it was moved to Rietfontein and later to Kabus. The hospital at Kuruman was then closed and the equipment, nurses and other personnel pushed forward in wagons and motors to Keetmanshoop.

In addition to the medical personnel with each regiment an ambulance wagon was attached to the larger units, but the country was unsuitable for mule transport and a small but efficient service of motor ambulance cars was organized by Captain Grainger, S.A.M.C. At Kabus they proved particularly useful in clearing the wounded. They were also sent on to the Central Force after it had captured Gibeon and were used for evacuating sick and wounded to Keetmanshoop. In the first stages of the advance of the Eastern Force casualties were evacuated to Mopeppa, Kuruman and Kimberley, later to Kabus, and then to Keetmanshoop. When the railway line was open from Keetmanshoop, ambulance coaches were employed to evacuate the sick to Lüderitzbucht, and thence by hospital ship to Cape Town.

At the beginning of December preparations were renewed for landing a Northern Force at Walfish Bay. It was known that General Botha, who had assumed the duties of Commander-in-Chief, would accompany this force and, in addition to infantry, mounted and other units, a number of commandos were specially raised.

The first portion of the force under the command of Colonel Skinner sailed from Cape Town on the 22nd December. The hospital ship "Ebani" was already anchored in Walfish Bay, and some of the accommodation on board had been utilized to carry the personnel of No. 2 Field Ambulance

and No. 2 M.B. Field Ambulance. It had been sent to Walfish Bay by the Director of Medical Services to deal with possible casualties at the time of landing and to act as a base hospital until the necessary preparations could be completed on shore. No opposition, however, was experienced, and the landing was effected on Christmas Day.

Dispositions having been made for the defence of Walfish, the most pressing question was the supply of water. Wells existed about 4 miles from the settlement, but the plant had been destroyed and the water polluted by the enemy. This possibility had been foreseen and a large supply of water had been brought up in the ballast tanks of the transports. The water was rapidly transferred to the shore and as soon as possible wells were opened up and water pumped to the camp. Unfortunately the well water was so brackish that it had to be mixed with the water brought from Cape Town before either men or animals could use it. A tent hospital was erected by No. 2 Field Ambulance at a convenient distance from the landing place, but difficulties were constantly experienced owing to water being reached about 2 ft. below the surface. The sand was eventually rolled into fairly firm ground, the site fenced, electric light and water laid on, and a few huts erected for X-ray plant, dispensary, and other accessories.

On the 13th January, the force under Colonel Skinner, accompanied by No. 2 M.B.F.A., made a night reconnaissance towards Swakopmund. The only possible route lay along the beach, and as the track approached the town it narrowed considerably. Here many land mines had been laid but fortunately few casualties occurred and the small enemy force speedily retired. The town was found to be abandoned and a temporary hospital was opened in it by " B " Section of No. 2 M.B.F.A. Skirmishes occasionally occurred with enemy patrols, but these never assumed such proportions as to hinder the work which was being done in preparation for the advance. As a port Swakopmund was practically useless, but railway material and locomotives had been shipped from Cape Town and a line was laid from the landing place at Walfish Bay. Before leaving Swakopmund the Germans had poisoned with arsenic the wells from which the water supply was drawn. The arsenic, however, was detected, and although this added to the preliminary difficulties no casualties occurred.

In the meantime reinforcements, transport and stores were constantly arriving, and No. 3 General Hospital under Lieut.-Colonel R. P. Mackenzie was established in buildings at Swakopmund. On the 11th February General Botha arrived and took over the command of the Northern Force, to which,

as already noted, Colonel B. A. Odlum had been appointed as A.D.M.S., and Major G. D. Maynard as sanitation officer and D.A.D.M.S. A number of mounted brigade field ambulances were with it, namely Nos. 2, 6, 7, 8, 9, 12, and 21.

On the 22nd February General Botha moved out from Swakopmund with the mounted troops and the country round was cleared. At places the water had again been poisoned, but a good supply was obtained from a farm in the valley of the Swakop river.

On the 19th March a strongly held position at Riet was captured and some of the mounted brigade field ambulances had their first experience of a prolonged engagement, which lasted from dawn till dusk. No. 7 M.B.F.A. under Majors van Coller and Murray quickly adapted themselves to the difficult conditions of working with mounted troops. Leaving the tent division to open out, the bearer division went forward, and by taking advantage of the ground gradually concentrated the ambulance wagons in a kloof. Working from the cover afforded, by sun-down they had collected all the wounded and transferred them back by motor ambulance cars to the tent division. Assistance was then given to the wounded collected by No. 9 M.B.F.A. and provision was made for their temporary reception at Husab. At Husab No. 2 M.B.F.A. established a field hospital and clearing station from which the casualties were gradually sent back to No. 3 General Hospital at Swakopmund.

Owing to transport difficulties full advantage could not at the time be taken of the success at Riet, and the route for the further advance was carefully considered. From Swakopmund two lines ran into the interior—the Otavi Railway and the Swakopmund–Karibib section of the State Railway. Both were narrow, 2 ft. gauge lines, but the terminus of the State Railway was at Karibib, where it connected with the first section of the 3 ft. 6 in. gauge line to Windhuk and the south. During his retreat the enemy had removed the rolling stock and as far as possible destroyed both lines.

To wait until the railway line could be repaired meant a long delay, and General Botha decided to advance with the mounted troops up the bed of the Swakop River. Before this advance could commence, supplies had to be collected as far forward as possible and all available transport was concentrated on this work. Progress was necessarily slow, and as most of the water had to be brought from the coast for both men and animals the mounted troops were sent back to Swakopmund and the position was taken over by infantry. In the meantime the work of relaying the Otavi line as far as Usakos with a 3 ft. 6 in. gauge was pushed on.

At dawn on the 26th April the railhead position at Trekkopjes was attacked by a strong force of the enemy. The attack failed, but covered by their artillery, the Germans were able to make good their retreat, leaving their dead and wounded on the field. The wounded were collected chiefly by " B " Section of No. 2 M.B.F.A. under Captains Edginton and Vaughan.

By the end of April the mounted troops were ready to advance, and as a preliminary step a field hospital was opened at Salem. The route decided on presented endless difficulties, and the enemy had, wherever possible, placed contact mines in the track. Though the mines occasioned some casualties the mounted troops advanced rapidly. Otyimbingue was reached early in May and a field hospital was temporarily established by No. 9 M.B.F.A. Karibib then surrendered and the German forces retreated northwards in the direction of Omaruru. The advance had only occupied sixteen days, but until Karibib was taken both men and animals suffered severely from lack of water.

With the fall of Karibib the mounted brigades closed in on Windhuk, and on the 12th May General Botha accepted its unconditional surrender from the Burgomaster. No. 9 M.B.F.A. marched into Windhuk with the right wing of the force which had advanced up the Swakop Valley. After Windhuk had been reached the unit was subdivided into smaller sections which were allotted to smaller formations. The German military hospital at Windhuk, in which a number of sick and wounded had been left, was at once adapted for the needs of the Northern Force. At Karibib a hospital was also established in the best buildings available.

At the request of the Imperial Governor of German South-West Africa a 48-hour armistice was arranged on the 20th May, but as the negotiations came to nothing the preparations for a northern campaign and an advance to Gibeon were continued. On the 18th June the advance was simultaneously commenced by three separate columns.

In the meantime the director of medical services, Colonel P. G. Stock, joined General Botha's staff at Karibib to arrange the reorganization of the medical services. During the advance from Swakopmund some of the mounted brigade field ambulances had not always been able to keep up over the rough tracks with the rapidly moving commandos. This was largely due to the fact that before the advance started the mules of their transport had been taken to drag forward supplies, and when they were returned to the ambulances just before the columns moved off the severe work had impaired

their condition. As the general staff anticipated heavy fighting, probably at Kalkveld, the question of increasing the mobility of the medical units was of the greatest importance. The personnel and equipment were, however, re-arranged and reduced as far as possible. With the reorganization of the lines of communication to Swakopmund, Major Whitehead, S.A.M.C., was appointed A.D.M.S., L. of C., with headquarters at Karibib. An ambulance train was organized to operate on the narrow gauge line to the north, and a field hospital was established at Omaruru. Subsequently Karibib became the clearing station for casualties on their way to Swakopmund.

Most of the country traversed during the northern advance presented the same appearance for miles. Slightly undulating, it was thickly covered with bush, which though negotiable by mounted men to an extent that did not seriously retard movement, was thick enough to render anything but a restricted view impossible. Owing to the rapidity of the advance and the flanking columns continually threatening to cut his lines of communications, the enemy evacuated the position at Kalkveld without offering resistance.

By the 24th June the railway from the south was open to Omaruru, and by the 2nd July to Kalkveld, which then became a large supply depôt. Otjivarongo was taken by the end of June and a field hospital at once established there.

The distance from Karibib to Otjivarongo is some 120 miles, and from Omaruru onwards the facilities for watering men and animals existed only at two points. Nevertheless, the bulk of the force covered the distance in less than a week under most trying conditions of thirst. Otavi was then captured, and an unlimited supply of good running water—the first seen during the campaign—became available.

The enemy now held a position of exceptional strength at Khorab. It was known that many mines had been laid and that the enemy was in force. Fighting with heavy casualties seemed imminent, and the field hospital at Omaruru was quickly transferred by motor lorries to Otavi.

Dispositions were made for closing the exits from Khorab and the first infantry brigade was ordered to be ready to attack from the south. This brigade had marched the 270 miles from Ebony Mine practically without a break. It covered the last 80 miles in four days, and the last 45 miles in 36 hours in order to be in time. No. 2 M.B.F.A. accompanied it and with short rations and little water covered the 245 miles over bad roads from Erongo in 16 days. *Pourparlers* were, however, taking place, and shortly before the hour fixed for the attack a messenger arrived from the German Imperial

Governor, Dr. Seitz, accepting the conditions offered, and at 10 a.m. on July 9th the terms of surrender were signed.

This terminated the campaign in the north and with it the operations of the Union Forces against the German troops in South-West Africa.

During the advances up the Swakop Valley and from Karibib to the north the amount of sickness was fortunately small, but casualties had at times to be carried forward in the ambulance wagons. As opportunity offered they were sent back to the field hospitals at Salem and Otyimbingue. After the surrender of Windhuk the difficulties were too great to continue evacuating sick and wounded down the Swakop Valley, and the hospitals at Karibib and Windhuk were used for their reception until they could be moved to the coast by train. Karibib was the chief hospital centre on the lines of communication, but trains were soon running between Karibib and Windhuk

The chief hospital base was always at Swakopmund, where No. 3 General Hospital was established in adequate buildings, the surgical division being in the San Antonius Hospital and the medical division in Prinzessin Ruprecht Heim. Later on the Prinzessin Ruprecht Heim was closed and the medical division transferred to the Swakopmund school, where alterations had been carried out and the buildings adapted for hospital purposes. Hot and cold water was laid on, sanitary accommodation provided, electric light installed, and the grounds fenced.

After the railway was opened between Walfish Bay and Swakopmund the advisability of transferring the medical base to Walfish and erecting a hutted hospital near the landing stage was considered, but the proposal was not proceeded with as it was thought that the campaign would not last long enough to justify the work.

From Swakopmund an ambulance train ran to the landing stage at Walfish Bay. The patients were transferred to lighters which were towed off to the hospital ship. From Walfish Bay to Cape Town is about 720 miles, and the voyage took from 3½ to 5 days, the ship usually calling at Lüderitzbucht on the way down. At Lüderitzbucht the patients had also to be transferred to the ship on lighters and it was always necessary to arrange for this being done before darkness set in. By the middle of August, 1915, the last of the patients had been evacuated to the Union of South Africa, and the military hospitals were either closed or reduced and adapted to the needs of the small garrison left for the military occupation of the former German territory.

CHAPTER XXI

THE MEDICAL SERVICES DURING THE OPERATIONS IN SOUTH-WEST AFRICA—(*contd.*)

ORGANIZATION, AMBULANCE TRANSPORT, AND STORES HEALTH OF THE TROOPS

THE scheme for the organization of the South African Medical Corps was somewhat similar to that for the Territorial Force, R.A.M.C., in Great Britain. There was to be a small staff of whole-time medical officers and non-commissioned officers for administration and instructional duties, and a few non-commissioned officers, trained in medical duties, were to be posted to the medical section of the permanent force staff from the South African Mounted Rifles. The actual medical units were to be raised and trained under the terms of the Defence Act. In 10 of the 15 military districts, into which the Union was divided, assistant directors of medical services had been appointed. These officers were engaged in ordinary practice, but were to command the active citizen force sections of the South African Medical Corps when under training in their districts, and under the directions of Defence Headquarters were generally to assist in the military medical administration. When the war started some of the units were just going into training camps, others were called up for training and then mobilized, and others again raised or completed by volunteers.

At Defence Headquarters the staff officer for medical services was directly responsible to the Minister for Defence and was the channel through which the Minister's instructions on medical administration would be communicated to those concerned. On the 1st September, 1914, when Colonel Stock was appointed Director of Medical Services, he assumed, subject to the Minister's instructions, responsibility for the medical services and the health of the troops. Medical headquarters were in Pretoria, but at the end of January, 1915, when the personnel had been recruited and the organization built up, they were moved to Cape Town, which became the chief medical base for the operations against German South-West Africa.

One of the most pressing needs in the early stages was to increase the staff at headquarters, and Major Egerton Brown was appointed D.D.M.S.; Lieut.-Colonel C. Porter, specialist

sanitation officer; Major M. W. McLoughlin, staff officer to the D.M.S.; and Mrs. Creagh,* Matron-in-Chief.

Throughout the campaign the medical headquarters staff, though augmented as the work increased, was maintained at a minimum. The work was carried on at high pressure, as owing to the rapidity of mobilization nearly every available medical officer with any military experience had immediately to be sent into the field. In the absence of any organization for the necessary medical care of the civilian population, it was impossible to provide at a moment's notice a sufficient number of medical officers from amongst the civil practitioners of the Union, even with the loyal co-operation of individual members of the medical profession, which was numerically weak in the Union, and was also depleted after the outbreak of hostilities by a number of its members proceeding to Europe for service with the R.A.M.C.

An outbreak of pneumonic plague in Cape Colony during the early stages of the war, for which no definite cause could be assigned, and the prevalence of malaria in the Eastern Transvaal in the later stages, also added to the difficulties in the selection and appointment of medical officers. In spite of these difficulties, however, the profession made a splendid response to the call for volunteers, and 280 medical officers served for varying periods during the campaign.

The decentralization, however, which under established conditions would have been the normal procedure, was rendered impossible by the lack of military experience and training of the personnel employed and involved almost the whole burden of control, organization, recruiting and instruction being borne by the headquarters staff.

Rules, regulations, orders, instructions, and memoranda on every conceivable subject of medical and allied interest had to be prepared and issued. Medical forms had to be drawn up or army forms adapted. Arrangements had to be made for the medical examination of recruits, which experience showed to be certainly one of the most difficult problems to deal with, and many mistakes were made. Indeed, it was not until later on in the war, when medical inspectors of recruits were appointed and medical examining boards established, that these difficulties could be adequately dealt with.

The recruiting and training of subordinate personnel were rendered easier by the readiness with which men volunteered. A training camp under Lieut.-Col. G. H. Usmar, a former officer of the R.A.M.C., was established at Wynberg near

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* Since Mrs. Stanford, R.R.C., O.B.E.

No. 1 General Hospital, but the period during which recruits, who were not trained with their units, could remain in it was never long enough. To compensate for the shortage of trained orderlies for nursing duties, additional nurses were employed, and many of these ladies cheerfully served in field hospitals under most trying conditions.

A statistical section was organized under Mr. Pearce, of the South African Office of Census and Statistics, and a card system was introduced for admissions to hospital. Experience showed that this system was beset with difficulties which were only overcome by the hard work and perseverance of the sectional staff, but Mr. Pearce was subsequently able to draw up an amended scheme.

Instructions were also issued in regard to the medical boarding of patients before discharge from base hospitals, and arrangements were made for handling and recording the proceedings at medical headquarters.

The fullest possible use was made of the civil hospitals in the Union both in connection with training and mobilization camps and also as centres in proximity to their homes to which patients could be evacuated from the medical bases. Every assistance was rendered by the authorities concerned and arrangements were completed under which practically every hospital in the Union would admit military patients at an inclusive daily fee of 5*s*. Much effective service was also rendered by local medical practitioners, who in most districts came loyally to the assistance of the military authorities.

In the earlier stages of the campaign much important work was performed by the assistant directors of medical services in the military districts, but the greatest volume of this work devolved on Colonel Buist, the senior medical officer at Cape Town, and Lieut.-Colonel Temple Mursell and Major Horwich, the A.D.M.S. and D.A.D.M.S., Johannesburg, and their staff.

Johannesburg was a large recruiting centre and the site of two mobilization camps and field hospitals. It also possessed the largest civil hospital in the Union, and numbers of serious surgical and medical cases were transferred to it.

The organization of the field medical units, with the exception of transport and the allotment of medical officers to units, was similar to that laid down for the Imperial Forces, a mounted brigade field ambulance being the equivalent of the cavalry field ambulance of the regular army.

As far as possible men with previous training were attached to regiments for water duties. A small percentage of the personnel of the five regiments of South African Mounted Rifles, which constituted a permanent force chiefly employed

on police duties in normal times, was trained in medical duties, and this personnel with the addition of specially enlisted men formed the mounted brigade field ambulance which accompanied Force A. As other units were formed every endeavour was made to post a small nucleus of trained men to each, and after Force A was broken up some of the personnel was used in this way. As far as possible one of the small staff of instructors or non-commissioned officers of the medical permanent force staff was posted to a medical unit as its warrant officer. Practically all these instructors had formerly been non-commissioned officers in the R.A.M.C. or had been seconded from it just before the war for temporary service with the Union Defence Forces, and their experience, ability and example were invaluable. Fortunately, also amongst the active citizen force units there was a number of non-commissioned officers who had served in the old volunteer medical corps of the Cape, Natal, and Transvaal, and it was largely due to them and the efforts of Colonel Odlum that the various medical units became as efficient as they did.

There being no depôt for the S.A.M.C. as a corps, the headquarters of No. 1 Field Ambulance at Johannesburg and the training centre at Wynberg were used as far as possible for this purpose, and many of the personnel recruited on the strength of these units were posted to other temporary formations and units in the field. In this way the stationary and field hospitals on the lines of communication, which were sometimes started by the tent division of a field ambulance, were gradually built up.

Medical units in the field obtained their reinforcements from the hospitals at the medical bases which were then sometimes hard pressed for personnel. On these occasions the energy and enthusiasm of the hard-worked staff were most in evidence and carried them over many difficulties.

The routes followed for the evacuation of casualties have already been indicated. With the exception of the Northern Force after its advance to Karibib, the A.D.M.S. with each force administered the medical services on the lines of communication to the base.

Telegraphic communication with the various forces was quickly established by the South African Signalling Corps, and by arranging an appointment by telegram and for the services of a skilled telegraphist a conversation could be carried on by the D.M.S. from defence headquarters with an officer perhaps 1,200 miles away in the field.

The lines of communication from Cape Town for medical services were supervised by the A.D.M.S. lines of communication,

Stretcher Bearers, South African Medical Corps.

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with headquarters in Cape Town under the senior medical officer of the Cape Peninsula, Colonel Buist. When Major J. A. Mitchell vacated this appointment, he was succeeded by Lieut.-Colonel John Hewat, who afterwards became A.D.M.S. in the Cape Peninsula.

The main base for the expeditionary force was at Cape Town, as already noted. Here the troops concentrated before embarking and camping sites had to be selected and prepared. During the rainy season the selection of suitable sites was difficult, and camps had to be formed on the slopes of Table Mountain. The selection of Cape Town as the base necessitated the immediate provision of hospital accommodation not only for the concentration of the troops, but also for the probable casualties coming back. The Imperial scheme for the defence of the Cape Peninsula provided for the mobilization of half a general hospital. As already stated, this was not immediately proceeded with, but the Imperial military hospital at Wynberg had been increased to 75 beds. When the Imperial garrison sailed this hospital was staffed by No. 1 Company of the S.A.M.C., and the hospital gradually expanded by utilizing the huts of Wynberg camp which gave accommodation for 850 patients. Lieut.-Colonel R. P. Mackenzie, the medical superintendent of the large civil hospital in Johannesburg, was appointed to command it, and with Major Merritt, a former officer of the R.A.M.C., as quartermaster, and some of the most experienced medical officers in the Union on the staff, No. 1 General Hospital quickly became a thoroughly efficient unit. When Lieut.-Colonel Mackenzie joined the Northern Force early in 1915, the command was taken over by Lieut.-Colonel A. B. Ward.

Although no estimate could be made of the probable number of casualties, provision for further hospital accommodation was considered essential. The ground in the vicinity of No. 1 General Hospital was suitable for its expansion by tents, but it was decided that, if possible, tented hospitals should be avoided during the heavy rains of the Cape winter. In addition separate accommodation had to be provided in all hospitals for coloured and native patients. A certain number of beds was reserved in the New Somerset and other hospitals in the Cape, but fortunately at Maitland, one of the suburbs of Cape Town, the erection of a large civil hospital for 1,000 chronic sick was nearing completion. Sir Frederick de Waal readily agreed to place these buildings and their equipment at the disposal of the Department of Defence, and in February, 1915, they were opened as No. 2 General Hospital under the command of Lieut.-Colonel Thornton.

Patients from Walfish Bay, Lüderitzbucht, and Port Nolloth were transferred by ambulance transport or hospital ship to Cape Town and admitted into one of the hospitals in the Cape Peninsula. Only in exceptional cases were patients from Upington transferred by train to De Aar and Cape Town. The hospitals at Kimberley and Johannesburg were more convenient for them, and the accommodation in the hospitals in the Cape was kept as free as possible for eventual casualties. Little use could be made of the hospital at Tempé near Bloemfontein for cases from the campaign in South-West Africa.

No scheme had been prepared for dental service, a want which was quickly felt, as it was in other theatres of war. Invaluable services were, however, rendered in the most public-spirited manner by dental practitioners at Cape Town, Johannesburg, and other centres throughout the Union, and dental units were organized both for the Central and Northern Force.

A provisional scheme for a South African Military Nursing Service had been prepared prior to the war, but further action had been postponed. With the outbreak of hostilities and the organization of military hospitals it became imperative to provide an adequate number of trained nurses, and provisional orders and instructions were brought into force. A matron-in-chief was appointed, who was responsible to the D.M.S., and a nursing service was rapidly organized. When called up for service the organization and duties of the S.A.M.N.S. were similar to those of the Imperial Nursing Service, but a larger proportion of nurses was enrolled in order to compensate for the shortage of nursing orderlies. Only trained nurses were accepted, but there was no lack of volunteers, and during the campaign 174 ladies were enrolled who rendered invaluable service not only in the general and stationary hospitals, but also in many cases in the field hospitals which were established with the various columns. On the termination of the campaign the majority of them volunteered for service in other theatres of war.

The scheme for sanitation which had been approved before the war was similar to that of the Imperial Army. Few combatant officers, however, had received instruction in field sanitation, and the special sanitation officers had to contend with many difficulties, particularly in connection with some of the newly raised mounted units. Even when camps were prepared for their reception, the men would use the latrine seats for firewood and the water pipes as tethering places for their horses. A small copiously illustrated handbook on field sanitation was hurriedly prepared and issued in English and

Dutch. As many trained sanitary inspectors as possible were posted to the sanitary sections which were gradually organized and which did invaluable work.

The difficulties were probably greatest with the Northern Force. When the mounted troops were concentrated round Swakopmund there was a shortage of materials and transport, and it was only by the perseverance of Major Maynard and the personnel working under his directions that any headway was made. To meet the difficulties, natives were largely engaged for sanitary duties, and were employed with each unit under a regimental non-commissioned officer, who received extra pay at the rate of 2*s.* 6*d.* a day.

The chlorination of drinking water was insisted on. No water-carts of a modern type were available, and even when water was brought up in bulk from Cape Town the possibilities of contamination were many. At first chloride of lime was issued in sealed tubes, each tube containing sufficient for one cartload of water. Later, when the supply of tubes was exhausted, the chloride of lime was issued in tins and a glass measure supplied.

Judging by the experience of previous campaigns it was anticipated that the sick-rate, more particularly from enteric fever and dysentery, would be high, and every effort was made to organize and carry out measures to protect the troops. Memoranda on dysentery, typhoid fever, and anti-typhoid inoculation were drawn up and issued.

From the beginning the importance of the para-typhoid fevers was recognized, and in the arrangements made for inoculating the troops a mixed vaccine of typhoid and para-typhoid strains was used. The greater portion of the vaccine was prepared under the direction of Dr. Watkins Pitchford in the South African Institute for Medical Research, but over 33,000 doses were generously supplied by Dr. Pratt Johnson from the South African Clinical Research Laboratory, Johannesburg. At first there was some hesitation amongst the men to submit themselves to inoculation, but after it had been intimated that only men so protected would be taken to South-West Africa, and the first batch of 3,000 had been inoculated under Major Maynard's direction in one afternoon, there was no further difficulty.

It is estimated that at least 95 per cent.—probably more—of the troops were adequately inoculated, but under the conditions which arose it was unfortunately impossible to complete the records from the regimental rolls. Owing to the protection afforded few cases of typhoid occurred. These it was possible at once to deal with effectively, and directly

they were able to travel they were transferred to the Union and not again sent into the field.

Flies, at all times in evidence in South Africa, were the common agencies for the spread of intestinal diseases. A highly efficient and economical method for dealing with these pests was recommended by Mr. Malley, one of the Government entomologists. Briefly, it consisted in the use of a " poison bait," made by sweetening and colouring a solution of arsenite of soda. An effective method for distributing the bait in likely places was to hang up branches with smooth leaves which were periodically sprayed with the arsenical solution. The method proved so successful in the Cape Peninsula under Mr. Malley's direction that large supplies of arsenite of soda were obtained and issued for use with the different forces.

Under Major Haydon, the sanitation officer with the Central Force, the methods originally recommended were considerably modified. Using Cooper's Dip, a large supply of which was found ready to hand, and which possessed the further advantage of being already coloured and more or less familiar as a poison, the distribution was supervised by the medical officers of the various units under whom a special sanitation non-commissioned officer usually took charge of the arsenical supplies. Collections of manure which could not be buried were regularly sprayed. Deep trench latrines were dug and the contents sprayed, and in some cases when water was very scarce the contents of the urine buckets proved an effective liquid for dissolving the arsenical preparation. By the adoption of the arsenical solution combined with other methods of camp sanitation Major Haydon reported that the mounted regiments of the Central Force practically cleared their camps of flies in a fortnight,

Reference has been made to the poisoning of water supplies by the enemy. A few days before the first force embarked the Intelligence Staff reported that the Germans might resort to this device. The director of medical services at once appealed to Dr. McCrae, the Government analytical chemist, for assistance, and in less than forty-eight hours a series of field outfits for testing for poisons had been prepared. Instructions were drawn up for their use and the outfits were despatched by train to the force at Cape Town.* Several chemists were subsequently attached to the sanitation section of the S.A.M.C. and posted to the various columns. The poison most commonly used was some preparation of arsenic. Protests to the commander of the German forces were unavailing.

* A summary of the directions for the use of the field poison testing equipment afterwards issued to all columns is given in Appendix G.

WARD IN "TROVATO" CONVALESCENT HOME.

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After the capture of Windhuk General Botha in a proclamation referred to this flagrant breach of the Hague Convention and reserved to himself the right at any time to exact reprisals.

Much of the laboratory work was done at the Government Laboratory in Cape Town by Major Robertson who worked shorthanded the whole time. Laboratories were afterwards organized with the Central and Northern Forces, and every use was made of the extensively equipped German Government institutions which were taken over as the Union troops advanced.

On the whole the troops suffered very little from animal parasites. On the first complaint of lice from one of the mobilization camps the whole question was promptly taken up by the specialist sanitation officer, and a memorandum on the subject was drawn up and circulated. Many factors no doubt contributed to this comparative freedom, and conditions such as existed in France never arose.

The clothing issued was on the whole satisfactory, but the great extremes of temperature frequently experienced were most trying. At one time there were considerable difficulties in obtaining serviceable boots.

More especially with the Central Force round Lüderitzbucht, the glare from the white sand was a constant source of discomfort, in some cases causing acute conjunctivitis. Tinted goggles were in consequence issued to the troops after the initial difficulties in obtaining a sufficient supply had been overcome. As the use of veils as a protection against the fine driving sand had been suggested, a large number was made by voluntary workers in Cape Town and issued. Under certain conditions they afforded some protection and added to the comfort of the troops.

The scale of rations approximated to that in force in France, 6 oz. of mealie meal with an ounce of sugar being a substitute for $\frac{1}{4}$ lb. of fresh meat at the option of commanding officers. Transport difficulties often made the issue of the full ration impossible, but the contracts were carefully supervised and the rations issued were of good quality.

The special supplies for the hospitals with the Northern Force were at first hardly sufficient, but the shortage of fresh milk was only met, and that to a limited extent, by sending up a number of cows from Cape Town.

Provision had been made in the Union Defence Act for voluntary aid being employed in connection with the medical services. From its inception, however, the Department of Defence had had more urgent duties to carry out, and the

co-ordination of voluntary aid in time of war had not been dealt with.

When hostilities commenced there were branches of the St. John Ambulance Brigade in South Africa, chiefly in connextion with the De Beer Mines and the South African railways. These detachments proved a valuable recruiting ground for the S.A.M.C. and, at Cape Town, St. John Ambulance details under the direction of Captain R. MacIntosh rendered consistently valuable service in connection with the disembarkation of invalids and on the ambulance trains from the docks to the stations at Wynberg and Maitland. To assist in conveying the casualties from these stations to the hospitals a regular convoy of private motor cars was arranged by Mr. Henessey, of the Automobile vlub.

Shortly before the war a Red Cross Society had been formed in the Transvaal, though its activities at that time were chiefly confined to mining work. In addition the Good Hope Red Cross Society, dormant since the South African War, existed in Cape Town, and Red Cross societies were afterwards organized in Natal and the Orange Free State.

From the outbreak of war these bodies rendered valuable service. Innumerable quantities of comforts were supplied to the hospitals, and the generous response to the public appeal placed sufficient funds at their disposal to continue a work which contributed materially to the comfort of the sick and wounded.

With the almost overwhelming pressure of work at Defence Headquarters it was impossible to undertake the organization of the numerous offers of assistance or deal with the offers of private residences as hospitals, and on the advice of the director of medical services the Minister of Defence appointed a committee under the chairmanship of Sir Thomas Smartt to deal with the whole question. This committee, which consisted of some of the most prominent citizens, was known as the official advisory committee on voluntary aid and met at Cape Town. One of the primary objects of the committee was to co-ordinate all offers of voluntary assistance, but it was not until the end of the campaign in South-West Africa that the various voluntary aid organizations were co-ordinated, with joint secretaries, for the duration of the war. Starting with a donation of £30,000 from the Transvaal Chamber of Mines, further funds were soon raised, and the committee undertook the provision of convalescent homes. The " Trovato " Convalescent Home was opened near No. 1 General Hospital, and, soon after, an additional home was opened in Mr. J. W. Jagger's house on the sea front at St. James's.

Dining Room in "Trovato" Convalescent Home.

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GERMAN CAMEL AMBULANCE.

LIGHT AMBULANCE WAGONS.

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In addition to the convalescent homes, Sir Thomas Smartt's committee provided the funds and undertook the alterations and fitting out of the " Ebani " as a hospital ship in accordance with the general specifications prepared by the director of medical services. The equipment and fittings of the " Ebani " were subsequently presented to the Imperial Government when it took over the " Ebani " on the termination of the South-West African campaign. Sir Thomas Smartt's committee also supplied the necessary funds with which to purchase the full equipment for No. 1 South African General Hospital when it proceeded to Europe.

The supply of veils to the troops by voluntary aid has already been referred to. It was entirely a matter of voluntary effort directed by a committee of ladies in Cape Town.

With regard to ambulance transport and methods of evacuation, no reserve of stretchers existed in the Union, and large numbers had to be made locally for the ordnance department. Unfortunately they were not always strictly in accordance with the standard pattern, and when not interchangeable occasioned many difficulties. The type of ambulance wagon was under investigation when the war commenced. The heavy army ambulance wagon was considered unsuitable, and a modified light ambulance wagon was adopted. This pattern was then built in the Union and issued to the field ambulances. As animal-drawn transport it proved satisfactory. A very light form of " galloping " ambulance wagon was also designed, and though most useful on occasions was found to be of limited utility. Round Lüderitzbucht the use of wheeled vehicles was impossible and sleighs with runners, 12 to 18 in. wide, were the best transport devised for getting over the sandy wastes. Many varieties of wheeled carriages for stretchers were also supplied at various bases, but their use was never popular with stretcher bearers.

Motor ambulance cars were first introduced in connection with the hospitals in the Union, and were preferable to other forms of transport. Two were issued to each of the mounted brigade field ambulances in place of animal-drawn ambulance wagons, and were found invaluable. Had it been possible animal transport would have been replaced to a much greater extent by motor ambulance cars. The type eventually designed consisted of a light car, with a relatively high engine power, to carry two lying-down cases and three sitting. For desert work the Germans had a camel corps and used the form of transport shown in the photograph, but for various reasons this was not adopted by the S.A.M.C.

The only rail ambulance transport available in the Union, beyond ordinary carriages, consisted of two coaches of the Princess Christian Hospital train which had been employed during the South African War. These were added to by building additional coaches of similar design. The South African Railways also converted empty postal vans, which with supports for stretchers, wide doors and suitable fittings made satisfactory accommodation for lying-down cases. Zavodoski's method for slinging stretchers in empty vans was utilized by Lieut.-Colonel de Kock at Bloemfontein for the purpose of organizing an ambulance train quickly, and for local use it proved efficient. To deal with individual cases a few motor rail trolleys were prepared and sent to the Northern and Central Forces, but their use was limited.

For sea transport hospital accommodation was first prepared on the "City of Athens," which was used as an ambulance transport. In the meantime every endeavour was being made to obtain a vessel for hospital purposes only, and eventually the s.s. "Ebani" was selected by the Senior Naval Transport Officer, Captain R. C. K. Lambert, R.N., and by Colonel Stock. As soon as the "Ebani" had been fitted and equipped as a hospital ship in Cape Town a staff was selected, the belligerent Governments were notified, and Lieut.-Colonel D. MacAulay took over the duties of officer commanding. As the "Ebani" had been a cargo vessel for the West African trade, the decks were not unduly divided, and large airy wards with single-tier swing cots were prepared. In addition to the fitted accommodation a reserve of naval swing cots was carried. In an emergency the "Ebani" could have carried about 500 patients inclusive of coloured and native cases, for whom separate accommodation was provided.

When war broke out the South African forces possessed practically no medical equipment. A quantity of field medical equipment was on order in England, but on the outbreak of hostilities in Europe this was taken over by the Imperial Government. The only field equipment which could then be obtained was a certain amount of obsolete pattern left by the Imperial garrison. This, however, was not sufficient, but with the aid of the Union Department of Prisons and the Ordnance Department of the Union Defence Force field medical panniers were made and fitted. On the whole these answered well, but breakage of containers was heavy, as suitable bottles were unobtainable and the ordinary pattern medicine bottle had to be used. The wholesale druggists also rendered every assistance, and the Public Health

Type of Motor Ambulance Car used during South-West African Campaign.

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Department was able to supply quinine in sufficient quantities for the Northern advance.

At the commencement of the campaign Major Cope was placed in charge of the section of medical headquarters dealing with medical equipment and proceeded to Cape Town to organize base medical stores and generally supervise the equipment of units before their departure. Later, advance depôts were opened at Lüderitzbucht, Swakopmund, Upington and, prior to the Northern advance, at Karibib. A smaller depôt was also opened for a short time at Kimberley to supply the requirements of the Eastern Force.

Considerable difficulties were met with in obtaining the requisite X-ray plant. Fortunately X-ray equipment was never required to any great extent in the field. Fairly satisfactory installations were found in some of the hospitals taken over from the enemy, but a train with an X-ray equipment, which was captured near Riet, was unfortunately destroyed.

No material shortage of necessary drugs occurred, but at times it was not always possible to complete the requisitions of medical officers, who often objected to substitutes. Few appeared to appreciate the difficulties under which supplies were obtained and sent forward. The old pattern equipment was also sometimes a source of complaint, and one which would certainly have been justified if it had been possible to obtain more modern equipment from Europe. As the campaign progressed, quantities of German stores were obtained which proved extremely useful to the units in the field.

On the termination of the campaign medical stores were gradually returned to the base medical stores at Cape Town, and steps were taken to sort out such as were still of use and refit medical panniers for further service in case of need.

With regard to the health of the troops, the following statistics refer to a period of 375 days, namely, from 5th August, 1914—the outbreak of war—to 14th August, 1915—the date of the evacuation of the last sick details from South-West Africa to the Union. It must be noted, however, that it was only in September, 1914, that the South African Parliament sanctioned the campaign, and that the terms of surrender which terminated the operations of the Union Forces against the Germans in South-West Africa were signed on 9th July, 1915.

On the other hand, when war was declared a number of training camps were open in the Union, and these formed a basis on which the mobilization was built up until definite centres were established. No record offices or statistical branch then existed and, as these had to be organized as the

mobilization proceeded, it was impossible to determine in many instances whether the earlier admissions to hospital had been definitely placed on an active service footing or not.

There were great difficulties in arriving at the average daily strength. The records show that 76,467 Europeans were enrolled, but the designation of units was sometimes changed, and it was not until the beginning of 1915 that a complete field state was compiled. However, after investigating all sources of information the mean daily average strength of the white troops for the whole period of hostilities can be taken as approximately 33,000.

Difficulties also occurred in regard to medical statistics, but, as at the beginning a card system was introduced for admission to hospitals and a careful continuous check and revision were carried out at the time, it is considered that errors in the following figures have been reduced to a negligible quantity :—

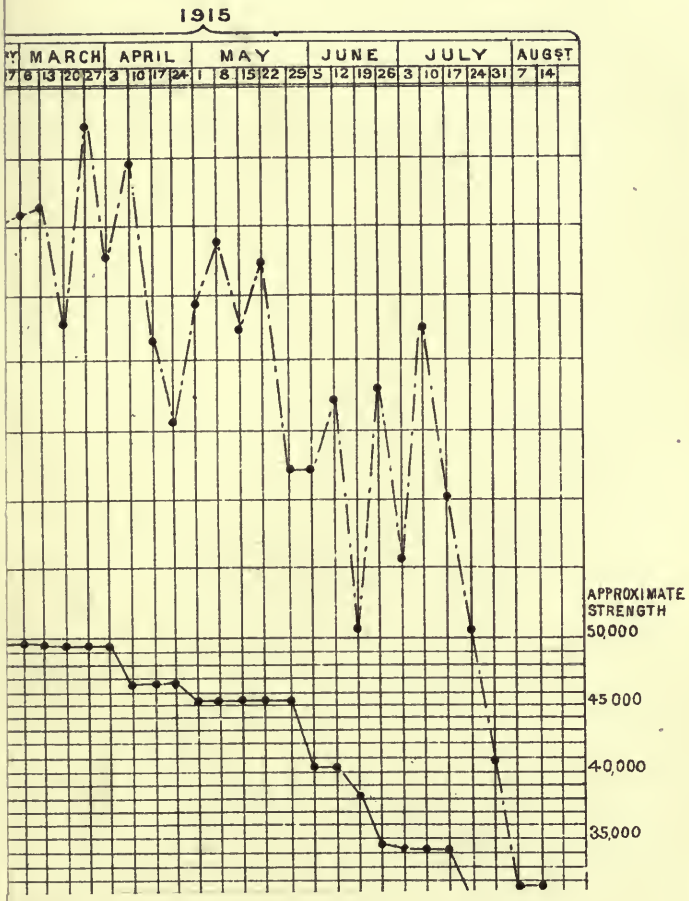
Admissions to Hospital :—	
The total number of admissions to hospital for all causes was	25,367
Remaining in Hospital :—	
At the close of the campaign, of the 25,367 admissions, the number remaining in hospital was	578
Sick-rates :—	
The average sick-rate per 1,000 during the period 1st January to 14th August, 1915, was	3·16
The average number constantly sick, officers, N.C.O.'s and men, was	1,126·5
The average sick time to each soldier was	12·8 days
The average duration of each case of sickness was.. ..	16·65 days
Deaths :—	
Killed in action or died of wounds	122
Killed in action or died of wounds in operations outside German South-West Africa	131
Died of accident or misadventure	58
Died of disease	115
The total number of deaths from all causes was consequently	426
The death-rate from disease per 1,000 per annum was ..	3·39

The chart shows the total number of cases remaining in hospital each week, the strength of the force, and the weekly sick-rates.

The number of admissions to hospital, deaths from disease, and the average duration of treatment for each group of diseases are shown in Appendix G, Table I. In Table II of the same appendix some of the more important diseases affecting military operations are shown in detail.

Two hundred and fifteen cases of typhoid or enteric fever were admitted to hospital. In addition, 15 probable cases, not treated in military hospitals, were traced, bringing the total number up to 230. Of the total cases only 69 occurred

ATIENTS IN HOSPITAL, AVERAGE STRENGTH
SICK BY WEEKS DURING THE
AFRICAN CAMPAIGN.



INCIDENCE OF ENTERIC FEVER

DEATH RATIOS PER 1,000 AVERAGE STRENGTH.

A. FOR WHOLE PERIOD - B. PER ANNUM

10314. 25789/476. 1000. 8.21.

Malby & Sons, Lith.

in the area of hostilities. Of the remainder, 48 occurred at the Training Depôt of the South African Mounted Rifles at Pretoria, the infection being traced to a native "carrier" employed in the cookhouse. This outbreak had no connection with the campaign, but the figures were included in the hospital returns. There were 20 deaths amongst the cases treated in military hospitals, giving a case mortality of 9·3 per cent. Amongst the outside cases six deaths occurred, bringing the total deaths from typhoid and paratyphoid fevers up to 26—equivalent to 0·78 per 1,000 of average strength for the whole period. The annual mortality ratio per 1,000 was 0·75. It is instructive to compare these figures with those of two recent campaigns in Africa, namely, the South African War of 1899–1902, and the German campaign against the Herreros of 1904–1907. The comparison is shown in the following table :—

Campaign.	Average Strength.	Total Deaths from Enteric Fever.	Ratio per 1,000 of Average Strength.	
			For the whole Period.	Per Annum.
South African War, 1899–1902 ..	209,404	8,227	38·8	14·7
German Herrero, 1904–07	11,367	529	46·5	16·3
South-West African, 1914–15 ..	**33,000**	**26**	**0·78**	**0·75**

In the German Herrero campaign the proportion of inoculated troops was stated to be very high, but the vaccine used was not prepared according to the methods so successfully used in the war of 1914–18.

The comparison is still further shown in the diagram, and is perhaps all the more striking when it is remembered that the figures for the first two campaigns refer to well-organized regular troops.

Some 500 cases of malaria were admitted to hospital, but in the majority of cases the disease was not contracted in South-West Africa. North of a line drawn east and west through Gibeon malaria was stated to be endemic and special anxiety was felt in regard to the advance north of Omaruru. Preparations were made and instructions issued for the prophylactic use of quinine, but the fact that the troops did not suffer was probably chiefly due to the advance being made in the winter months.

With regard to dysentery, figures showing the incidence of the disease in the different forces are unfortunately not

available. It is known, however, that the majority of the cases, as well as a number of cases of enteritis, occurred in the Northern Force at Swakopmund. A suspicion that the wells had been contaminated was never confirmed, though tubes containing a mixed culture of a streptococcus and a dysentery bacillus were found in the water supply at Riet. Similar cultures in bulk were afterwards discovered in the German State Bacteriological Laboratory at Windhuk. As will be seen from Table II of Appendix G, the disease was of a very mild type, the case mortality being only 1·5 per cent., and the average duration of stay in hospital 15·52 days.

There were 227 admissions for syphilis and 1,130 for gonorrhœa, a proportion of 1 to 5. The incidence ratio per 1,000 per annum on the average strength was 6·1 for syphilis and 33·2 for gonorrhœa. The average duration of treatment in hospital was 37·12 days for syphilis and 21·67 for gonorrhœa, but stringent orders had been issued that every soldier who contracted venereal disease was to be discharged from the service and not permitted to take any further part in the campaign, so that the actual duration of each disease is uncertain.

Only 124 cases of pneumonia, with a case mortality of 8 per cent. were admitted to hospital. The reasons for the low incidence are not entirely clear, but it is probably accounted for by the fine stamina of the troops and the absence of any virulent infection. The open-air life, which the troops led, may have accounted for this.

Bilharzia is endemic in many parts of the Union of South Africa, and the 153 admissions for this disease cannot be taken as any index of the number of men affected. On the other hand, an average stay in hospital of just over 15 days is an indication of the importance with which the disease was regarded on active service.

Admissions to hospital include 406 cases of heat-stroke or other effects of heat, with only one death. The majority of cases occurred amongst troops operating in the vicinity of Upington during January, February, and March, 1915. The predominant symptoms were a few days' fever, severe headache, and general pains, followed by prostration. Upington, which lies in the valley of the Orange River, is extremely hot during this period of the year, but it seemed doubtful whether the diagnosis was correct. Enquiries were instituted and it was then established that the cases bore a close resemblance to phlebotomus fever. No previous account of sand-fly fever having occurred in South Africa could be traced, and opportunities did not occur for an extended search for the sand-fly.

The opinion, however, was formed that the majority of the cases were cases of phlebotomus fever.*

The amount of dental deficiency was considerable and many men were no doubt accepted whose teeth rendered them unsuited for active service in the field. The task of rendering them dentally fit in the time allowed would have been impossible.

In connection with gunshot wounds, it is of interest to note that gas gangrene and tetanus were unknown. Suppuration followed in many cases, but wounds on the whole did well under the ordinary methods of treatment.

The weekly sick-rates for the period 27th December, 1914, to 14th August, 1915, are shown in the chart and in Table III of Appendix G. The causes of death from diseases are shown in Table IV of Appendix G.

The number of admissions to, and the number of deaths in hospitals classified according to the arm of the service are shown in Table V, and a summary of the numbers of officers, non-commissioned officers and men treated at the principal hospital bases is given in Table VI of the same Appendix.

A large number of natives accompanied the forces to South-West Africa. Most officers had their own native bâtmen, and natives were largely employed in connection with hospitals, with regimental transport and for sanitation work. Exclusive of such natives the numbers recruited for work on the railways, for transport and remount duties, and as general labourers are shown in the following table, which gives the number of native labourers recruited territorially for service with the Union Defence Forces during the period 4th August, 1914, to 31st August, 1915 :—

Nature of Employment.	Cape.	Transvaal.	Orange Free State.	Basutoland.	Bechuanaland	Natal.	Total.
Union Railways ..	3,873	1,768	61	56	305	—	6,063
S.W.A. Railways..	2,757	4,651	922	2	686	—	9,018
Transport and Remounts	7,392	3,818	753	—	303	122	12,378
General Labourers	1,808	3,593	340	—	32	314	6,087
Total ..	15,830	13,830	2,076	58	1,326	426	33,546†

The estimated daily average number employed was 15,000.

* A paper by Captain Cairns, S.A.M.C., on the cases at Upington, appeared in the *South African Medical Record* for March, 1916.

† These figures are exclusive of a number of natives engaged independently and taken to German South-West Africa by units or individuals.

Whilst natives with units were looked after by the medical officer attached to the unit, the responsibility for the medical care of others was also thrown on the South African Medical Corps and separate accommodation had to be provided for them in the hospitals.

Before proceeding to South-West Africa natives were as far as possible inoculated against typhoid fever, but complete records are not available either with regard to the exact number inoculated or the general incidence of disease. The amount of sickness was small, but the number of deaths, 104, cannot be taken as exhaustive or complete.* They merely indicate the general health of the native labourers. No serious outbreak of disease, however, occurred, and there were very few cases of enteric fever or dysentery amongst them.

* *See* Appendix G, Table VII.

APPENDIX A

MEDICAL UNITS OF THE EXPEDITIONARY FORCE MOBILIZED IN AUGUST, 1914

Field Medical Units.

Name of Unit.	Commanding Officer.	Place of Assembly.	Date of Completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
Cavalry Division:						
No. 1 Cavalry Field Ambulance	Major J. W. Langstaff	Aldershot	10/8/1914	15/8/1914	Southampton	Havre.
No. 2 Cavalry Field Ambulance	Major Langford Lloyd	Warley	10/8/1914	17/8/1914	Southampton	Havre—Rouen.
No. 3 Cavalry Field Ambulance	Major J. W. West	Curragh	14/8/1914	16/8/1914	Queenstown	Havre.
No. 4 Cavalry Field Ambulance	Major T. H. J. C. Goodwin	Shorncliffe	12/8/1914	17/8/1914	Southampton	Havre—Rouen.
5th Cavalry Brigade:						
No. 5 Cavalry Field Ambulance	Major J. Grech	Colchester	14/8/1914	16/8/1914	Southampton	Rouen.
1st Division:						
No. 1 Field Ambulance	Major H. A. Hinge	Aldershot	12/8/1914	17/8/1914	Southampton	Boulogne.
No. 2 Field Ambulance	Lieut.-Col. L. A. Mitchell	Aldershot	17/8/1914	18/8/1914	Southampton	Boulogne.
No. 3 Field Ambulance	Lieut.-Col. J. C. Morgan	Aldershot	13/8/1914	18/8/1914	Southampton	Boulogne.
2nd Division:						
No. 4 Field Ambulance	Major P. H. Collingwood	Aldershot	14/8/1914	16/8/1914	Southampton	Boulogne.
No. 5 Field Ambulance	Lieut-Col. R. J. Copeland	Aldershot	14/8/1914	18/8/1914	Southampton	Boulogne.
No. 6 Field Ambulance	Major T. J. Potter	Aldershot	16/8/1914	19/8/1914	Southampton	Rouen.
3rd Division:						
No. 7 Field Ambulance	Lieut.-Col. A. Kennedy	Tidworth			Southampton	Rouen.
No. 8 Field Ambulance	Lieut.-Col. C. A. Stone	Devonport	15/8/1914	18/8/1914	Southampton	Rouen.
No. 9 Field Ambulance	Lieut.-Col. G. S. McLoughlin	Southsea	13/8/1914	19/8/1914	Southampton	Rouen.
4th Division:						
No. 10 Field Ambulance	Major C. W. Profeit	Maidstone	11/8/1914	22/8/1914	Southampton	Rouen.
No. 11 Field Ambulance	Lieut.-Col. J. F. H. Kelly	Colchester		23/8/1914	Southampton	Boulogne.
No. 12 Field Ambulance	Major F. Fitzgerald	Dover	12/8/1914	23/8/1914	Southampton	Boulogne.
5th Division:						
No. 13 Field Ambulance	Major H. S. Thurston	Dublin	13/8/1914	15/8/1914	Dublin	Havre.
No. 14 Field Ambulance	Major G. S. Crawford	Dublin	17/8/1914	18/8/1914	Dublin	Havre.
No. 15 Field Ambulance	Major H. W. Slayter	Dublin	14/8/1914	18/8/1914	Dublin	Havre.
6th Division						
No. 16 Field Ambulance	Major A. C. Fox	Cork	11/8/1914	9/9/1914	Southampton	St. Nazaire.
No. 17 Field Ambulance	Major J. P. Silver	Cork	13/8/1914	9/9/1914	Southampton	St. Nazaire.
No. 18 Field Ambulance	Lieut.-Col. A. A. Watson (S.R.)	Manchester	17/8/1914	8/9/1914	Southampton	St. Nazaire.
Army Troops:						
No. 19 Field Ambulance	Major W. B. Fry	Woolwich	16/8/1914	19/8/1914	Southampton	Rouen.
No. 20 Field Ambulance	Major E. B. Steele	Aldershot	16/8/1914	19/8/1914	Southampton	Rouen.

Clearing Hospitals.

Name of Unit.	Commanding Officer.	Place of Assembly.	Date of Completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
No. 1 Clearing Hospital	Major F. A. Symons	Portsmouth ..	10/8/1914	18/8/1914	Southampton ..	Rouen.
No. 2 Clearing Hospital	Lieut.-Col. F. J. Morgan	Maidstone	14/8/1914	17/8/1914	Southampton ..	Rouen.
No. 3 Clearing Hospital	Major K. B. Barnett	Aldershot	14/8/1914	17/8/1914	Southampton ..	Rouen.
No. 4 Clearing Hospital	Major J. G. McNaught	Aldershot	14/8/1914	17/8/1914	Southampton ..	Rouen.
No. 5 Clearing Hospital	Lieut.-Col. A. W. Bewley .. .	York	13/8/1914	17/8/1914	Southampton ..	Rouen.
No. 6 Clearing Hospital	Lieut.-Col. B. Forde	Portsmouth ..	16/8/1914	18/8/1914	Southampton ..	Rouen.

Stationary Hospitals.

Unit.	Commanding Officer.	Place of Assembly.	Date of Completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
No. 1.	Bt.-Colonel F. Smith	Dublin	15/8/1914	18/8/1914	Dublin	Havre.
No. 2.	Major W. L. Steele	Tidworth ..	8/8/1914	13/8/1914	Southampton ..	Boulogne.
No. 3.	Lieut.-Colonel J. S. Green ..	Dublin	12/8/1914	18/8/1914	Dublin	Havre.
No. 4.	Lieut.-Colonel A. L. F. Bate ..	Woolwich ..	15/8/1914	26/8/1914	Southampton ..	Havre.
No. 5.	Major W. J. Taylor	Portsmouth ..	7/8/1914	14/8/1914	Southampton ..	Boulogne.
No. 6.	Major H. Hewetson	Woolwich ..	25/8/1914	26/8/1914	Southampton ..	Havre.
No. 7.	Lieut.-Colonel W. E. Berryman ..	Aldershot ..	10/8/1914	14/8/1914	Southampton ..	Boulogne.
No. 8.	Lieut.-Colonel C. A. Young ..	Woolwich ..	25/8/1914	26/8/1914	Southampton ..	Havre.
No. 9.	Major E. W. Blake Knox ..	Colchester ..	9/8/1914	14/8/1914	Southampton ..	Havre
No. 10	Major E. A. Bourke	Burscough ..	8/8/1914	14/8/1914	Southampton ..	Havre.
No. 11.	Major J. R. McMunn	Devonport ..	26/8/1914	26/8/1914	Southampton ..	Havre.
No. 12.	Major J. H. Campbell	Chatham ..	25/8/1914	26/8/1914	Southampton ..	Havre.

General Hospitals.

Unit.	Commanding Officer.	Place of Assembly.	Date of Completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
No. 1.	Lieut.-Colonel C. Dalton	Dublin	16/8/1914	18/8/1914	Dublin	Havre.
No. 2.	Bt.-Colonel M. P. C. Holt ..	Aldershot ..	12/8/1914	14/8/1914	Southampton ..	Havre.
No. 3.	Lieut.-Colonel S. F. Clark ..	Burscough ..	12/8/1914	14/8/1914	Southampton ..	Rouen.
No. 4.	Major Babington	Woolwich ..	22/8/1914	23/8/1914	Southampton ..	Rouen.
No. 5.	Lieut.-Colonel J. J. Russell ..	Portsmouth ..	16/8/1914	17/8/1914	Southampton ..	Rouen.
No. 6.	Lieut.-Colonel F. S. Le Quesne ..	Chatham ..	14/8/1914	17/8/1914	Southampton ..	Havre.
No. 7.	Lieut.-Colonel C. W. H. Whitestone	Colchester ..	13/8/1914	14/8/1914	Southampton ..	Boulogne.
No. 8.	Lieut.-Colonel L. T. M. Nash ..	Woolwich ..	19/8/1914	21/8/1914	Southampton ..	Havre.
No. 9.	Lieut.-Colonel B. H. Scott ..	Chatham ..	16/8/1914	21/8/1914	Southampton ..	Havre.
No. 10.	Lieut.-Colonel J. W. Bullen ..	Woolwich ..	20/8/1914	21/8/1914	Southampton ..	Havre.
No. 11.	Lieut.-Colonel W. H. Starr ..	Woolwich ..	22/8/1914	23/8/1914	Southampton ..	Rouen.
No. 12.	Lieut.-Colonel J. C. Jameson ..	Woolwich ..	22/8/1914	23/8/1914	Southampton ..	Rouen.
Convalescent Depôt.	Major G. B. Riddick	Aldershot ..	12/8/1914	14/8/1914	Southampton ..	Havre.

Sanitary Sections and Squads.

Unit.	Commanding Officer.	Place of Assembly.	Date of Completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
No. 1.	Major A. L. A. Webb	Aldershot ..	12/8/1914	13/8/1914	Southampton ..	Havre.
No. 2.	Major R. B. Ainsworth	Netley	8/8/1914	13/8/1914	Southampton ..	Boulogne.

Sanitary squads Nos. 1 to 8 mobilized with No.1 Sanitary Section and Nos. 9 to 11 with No. 2 Sanitary Section; but all embarked with No. 1 Section and went in the first instance to Havre.

Advanced Depôts of Medical Stores.

Unit.	Commanding Officer.	Place of Assembly.	Date of Completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
No. 1.	Lieut.-Colonel J. H. E. Austin ..	Woolwich ..	12/8/1914	17/8/1914	Southampton ..	Rouen.
No. 2.	Major H. S. Taylor					
No. 3.	Major A. O. B. Wroughton ..		12/8/1914	17/8/1914	Southampton ..	Rouen.

Base Depôts of Medical Stores.

Unit.	Commanding Officer.	Place of Assembly.	Date of Completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
No. 1.	Major J. W. Barbour	Woolwich ..	18/8/1914	20/8/1914	Southampton ..	Havre.
No. 2.	Major B. Watts		15/8/1914	20/8/1914	Southampton ..	Havre.
No. 3.	Major I. A. O. McCarthy ..		15/8/1914	21/8/1914	Southampton ..	Havre.

Ambulance Trains.

Unit.	Commanding Officer.	Place of Assembly.	Date of completion of Mobilization.	Date and Port of Embarkation.		Port of Disembarkation.
				Date.	Port.	
No. 1.	Major E. W. W. Cochrane ..	Aldershot ..	The ambulance train units completed their mobilization in France at various dates. The personnel only mobilized at Aldershot and embarked for France with the expeditionary force.	14/8/1914	Southampton ..	Boulogne.
No. 2.	Major C. D. Myles	Aldershot ..		14/8/1914	Southampton ..	Boulogne.
No. 3.	Major B. B. Bourke	Aldershot ..		14/8/1914	Southampton ..	Boulogne.
No. 4.	Major A. H. Waring ..	Aldershot ..		14/8/1914	Southampton ..	Boulogne.
No. 5.	Major B. R. Dennis ..	Aldershot ..		14/8/1914	Southampton ..	Boulogne.
No. 6.	Major E. A. Moore	Aldershot ..		14/8/1914	Southampton ..	Boulogne.

Hospital Ships.

Unit.	Commanding Officer.	Name of Ship.	Place of Assembly.	Date of Sailing.	Port.	Port of Destination.
No. 1.	Major J. Matthews	"St. David" ..	Aldershot ..	24/8/1914	Southampton..	Havre.
No. 2.	Major F. A. Stephens	"St. Patrick"	Netley ..	24/8/1914	Southampton..	Rouen.
No. 3.	Major S. De C. O'Grady	"St. Andrew"	Netley ..	24/8/1914	Southampton..	Rouen.

APPENDIX B

MILITARY HOSPITAL SHIPS AND AMBULANCE TRANSPORTS, SHOWING DATE OF COMMISSION, IN CHRONOLOGICAL ORDER

Military Hospital Ships and Ambulance Transports.

SHIPS.	STAFF.					ACCOMMODATION FOR SICK AND WOUNDED.						
	Officers.		W.O.'s.	Nurses and Sisters.	R.A.M.C. and St. John Ambulance, etc.	Native Staff.	Officers.		W.O.'s.	Cots.	Berths.	Period of Service.
	British.	Indian					British.	Indian.				
"St. Andrew" ..	4	—	—	4	26	—	16	—	—	23	155	19/8/14—29/5/19
"St. David"	4	—	—	4	26	—	14	—	—	23	157	19/8/14—16/1/19
"St. Patrick"	4	—	—	4	28	—	17	—	—	28	146	19/8/14—26/1/19
"Devanha"	9	—	2	12	58	—	27	—	6	287	204	22/8/14—28/2/19
"Asturias"	8	—	—	24	65	—	—	—	—	413	483	28/8/14—21/3/17
"Carisbrooke Castle"	—	—	—	12	38	—	16	—	—	196	227	3/9/14—26/8/19
"Glengorm Castle" ..	8	9	1	6	24	70	3	5	12	127	206	10/9/14—Still on Service
"Sicilia"	7	12	1	—	—	1	2	6	4	109	214	10/9/14—11/9/18
"Oxfordshire" ..	6	—	—	13	41	—	22	—	—	216	324	15/9/14—24/3/18
"Guildford Castle" ..	8	—	1	13	59	—	36	—	7	134	250	22/9/14—19/11/18
"Gloucester Castle" ..	8	—	—	10	41	—	36	—	4	128	242	24/9/14—9/9/19
"Glenart Castle" ..	8	—	1	13	59	—	28	—	4	105	316	30/9/14—26/2/18
"Loyalty"	—	9	—	—	—	—	44	14	—	124	143	2/10/14—30/11/18
"Madras"*	—	—	—	—	—	—	—	—	—	450	—	2/10/14—4/11/19
"Syria"	7	8	1	—	—	62	2	6	4	109	214	2/10/14—10/2/20
"Varsova"*	—	—	—	—	—	—	—	—	—	475	—	8/10/14—8/5/20
"St. Dennis" ..	4	—	—	6	28	—	14	—	—	108	109	12/10/14—18/10/19
"Goorkha"	—	7	1	7	37	—	—	10	—	94	304	20/10/14—18/10/17
"Letitia"	8	—	—	12	60	—	38	—	6	161	344	18/11/14—1/8/17
"Gascon"	5	2	1	10	42	33	11	—	4	120	266	25/11/14—15/2/20
"Valdivia"	6	—	—	12	60	—	24	—	—	257	270	29/11/14—22/12/19
"Salta"	6	—	—	12	45	—	16	—	—	213	232	3/12/14—9/4/17
"Nevasa"	6	—	—	12	52	—	—	—	—	254	406	8/1/15—25/3/18
"Delta"	6	—	—	12	45	—	27	—	6	287	210	14/1/15—19/3/18
"Brighton"	3	—	1	4	26	—	6	—	—	20	114	18/3/15—15/5/20
"Anglia"	3	—	—	4	28	—	6	—	—	25	244	25/4/15—17/11/15
"Dieppe"	3	—	—	4	27	—	—	—	—	33	134	6/5/15—7/4/17
"Newhaven"	3	—	—	4	27	—	6	—	—	19	138	7/5/15—5/3/19

Military Hospital Ships—cont.

SHIPS.	STAFF.					ACCOMMODATION FOR SICK AND WOUNDED.						
	Officers.		W.O.'s.	Nurses and Sisters.	R.A.M.C and St. John Ambulance, etc.	Native Staff.	Officers.		W.O.'s.	Cots.	Berths.	Period of Service.
	British	Indian.					British.	Indian.				
"St. George"	4	—	—	4	30	—	17	—	—	115	146	7/5/15—4/12/17
"Massilia"	5	—	—	11	44	—	—	—	—	53	322	12/5/15—25/3/16
"Assaye"	8	—	—	10	45	—	—	47	8	100	333	16/5/15—2/3/20
"Maheno"	10	—	1	6	60	—	15	—	—	93	407	25/5/15—2/6/19
"Dongola"	7	—	—	12	58	—	27	—	4	271	204	25/5/15—11/7/19
"Neuralia"	9	—	2	15	60	—	27	—	—	245	358	12/6/15—31/7/19
"Grantully Castle" ..	9	—	1	15	59	—	18	—	—	184	350	22/6/15—11/3/19
"Galeka"	8	—	—	10	54	—	—	—	—	254	112	22/6/15—28/10/16
"Formosa"	8	—	2	13	40	—	15	—	—	112	290	23/6/15—7/7/19
"Dunluce Castle" ..	10	—	—	16	74	—	34	—	18	223	480	6/7/15—2/4/19
"Panama"	7	—	1	10	58	—	19	—	—	217	248	25/7/15—23/11/19
"Egypt"	10	—	2	10	58	—	15	—	5	175	266	2/8/15—1/6/19
"Cambria"	3	—	—	4	29	—	—	—	—	31	158	8/8/15—20/1/19
"Takada"*	—	—	—	—	—	—	—	—	—	450	—	10/8/15—29/4/19
"Dover Castle" ..	9	—	2	9	60	—	5	—	—	286	316	11/8/15—26/5/17
"Karoola"	14	—	2	21	92	—	44	—	6	288	185	11/8/15—6/11/18
"Ebani"	6	—	—	13	36	—	—	—	—	508	—	13/8/15—12/10/19
"Tagus"	7	—	—	8	42	—	—	—	—	—	418	24/8/15—31/3/16
"Kanowna"	14	—	—	21	70	—	26	—	6	204	188	26/8/15—8/7/19
"Karapara"	7	—	2	11	40	—	16	—	7	318	—	27/8/15—20/2/16
"Jan Breydel" ..	2	—	1	4	28	—	6	—	—	36	116	27/8/15—1/8/19
"Essequibo"	9	—	2	16	76	—	42	—	—	249	298	2/9/15—12/9/19
"Aquitania"	41	—	—	102	351	—	196	—	—	893	3093	4/9/15—27/12/17
"Varela"*	—	—	—	—	—	—	450	—	—	—	—	2/10/15—Still on Service

Military Hospital Ships—cont.

SHIPS.	STAFF.						ACCOMMODATION FOR SICK AND WOUNDED.					
	Officers.		W.O.'s.	Nurses and Sisters.	R.A.M.C. and St. John Ambulance, etc.	Native Staff.	Officers.		W.O.'s.	Cots.	Berths.	Period of Service.
	British.	Indian.					British.	Indian.				
"Stad Antwerpen" ..	3	—	1	4	26	—	16	—	—	18	131	2/10/15—12/12/19
"Dunvegan Castle" ..	9	—	—	13	46	—	—	—	—	66	334	6/10/15—20/4/16
"Kildonan Castle" ..	11	—	—	18	60	—	18	—	—	55	530	6/10/15—10/3/16
"Lanfranc"	5	—	—	10	—	—	—	—	—	109	294	6/10/15—17/4/17
"Braemar Castle" ..	8	—	2	12	50	—	20	—	—	195	206	7/10/15—1/8/19
"Morea"	12	—	2	21	63	—	59	—	—	100	591	8/10/15—28/3/16
"Aberdonian"	4	—	1	4	27	—	6	—	—	25	214	16/10/15—16/6/19
"Western Australia"	5	—	1	4	36	—	8	—	—	75	222	21/10/15—6/12/18
"Mauretania" ..	22	—	—	21	177	—	—	58	57	592	1,238	22/10/15—1/3/16
"Vita"*	—	—	—	—	—	—	—	—	—	405	—	27/10/15—24/2/20
"Ellora"*	—	—	—	—	—	—	—	—	—	475	—	12/11/15—10/1/20
"Britannic"	52	—	1	101	336	—	169	—	32	1,035	2,074	13/11/15—21/11/16
"Copenhagen" ..	4	—	4	6	28	—	—	—	—	122	132	1/1/16—5/3/17
"Erinpura"	—	—	—	—	—	—	—	—	—	475	—	1/5/16—13/6/19
"Herefordshire" ..	7	—	1	10	43	—	50	—	—	230	100	25/7/16—1/1/18
"Warilda"	9	—	1	15	63	—	12	—	—	346	188	25/7/16—3/8/18
"Llandovery Castle"	—	—	—	—	—	—	21	—	6	303	292	26/7/16—27/6/18
"Wandilla"	9	—	1	17	63	—	12	—	—	349	188	5/8/16—15/3/18
"Princess Elizabeth"	3	—	1	3	27	—	—	—	—	30	—	8/11/16—3/9/19
"Marama"	—	12	—	24	62	—	—	21	—	72	4	Period doubtful
"Pieter de Connick"..	3	—	1	—	26	—	19	—	—	38	320	16/3/17—28/3/19
"Araguaya"	10	—	1	—	100	—	54	—	9	287	490	2/5/17—8/11/19
"Kalyan"	10	—	1	—	88	—	51	—	6	252	512	4/5/17—29/11/19
"Vasna"	9	10	1	7	—	55	16	16	9	57	460	29/5/17—Still on Service.
"Ville de Liège" ..	3	..	1	—	30	—	7	—	—	27	139	13/6/17—30/12/18

The following yachts were also employed for carrying sick and wounded: "Sheelah" (Yacht).—Gift.—August, 1914—February, 1919. "Albion" (Yacht).—Gift.—30/10/14—about 21/2/15. "Queen Alexandra" (Yacht).—Gift.—February, 1915—about 20/1/19. "Grianaig A. T." (Yacht).—Gift.—4/7/18—about February, 1919. "Prince George."—Requisitioned by the Canadian Government and released almost immediately.

Vessels marked *—Accommodation approximate only. Figures given for "Delta" are for it as Military Hospital Carrier, no other figures being available.

The "Donegal," which was sunk when carrying wounded, was used as a hospital ship or carrier, but no details have been obtained.

APPENDIX C

LIST OF HOSPITAL SHIPS DESTROYED BY SUBMARINES OR MINES

(Some of the hospital ships were destroyed after they had been classed as ambulance transports)

H.S. "ANGLIA."—Mined off Dover on 17th November, 1915, in the afternoon; 14 officers and 374 men, sick and wounded on board; 9 officers and 244 men were saved by destroyers, patrol boats, etc.; 5 officers and 128 men were lost, also 1 sister and 9 men of the R.A.M.C. staff.

H.S. "GALEKA."—Mined off Havre on 28th October, 1916, at 6.10 a.m., in a strong gale and heavy sea; no patients on board; 19 R.A.M.C. orderlies were killed in the initial explosion, all the other staff and ship's crew were saved; the ship was beached, but became a total wreck.

H.S. "BRITANNIC."—Sunk by mine on 21st November, 1916, at 8.12 a.m., in the Aegean Sea; there were no patients on board, and the day was warm, with a calm sea; all the staff were saved with the exception of Lieut. J. Cropper, R.A.M.C., and 8 orderlies; the evacuation was carried out with difficulty, on account of the movement of the ship, which continued to travel for some distance before finally sinking.

H.S. "BRAEMAR CASTLE."—Mined in the Aegean Sea, on 23rd November, 1916.

H.S. "GLENART CASTLE."—Mined at 11.30 p.m. 1st March, 1917, *en route* from Havre to Southampton; 520 sick and wounded on board, including 300 cot cases; all patients and crew saved by destroyers, tugs and trawlers; ship cleared of invalids by 12.50 a.m.; the weather was unusually mild, and the sea practically a dead calm; the ship was towed into Portsmouth. It was mined a second time on 26th February, 1918, and sunk.

H.S. "ASTURIAS."—Torpedoed on 21st March, 1917, at midnight, off Devonshire coast; no patients on board; Temporary Captain G. L. Atkinson, R.A.M.C., Staff Nurse J. J. Phillips, and 12 R.A.M.C. orderlies were drowned; the ship was beached at Salcombe.

H.S. "GLOUCESTER CASTLE."—Torpedoed at 7 p.m., on 30th March, 1917, *en route* from Havre to Southampton; 399 patients, including 300 cot cases, on board; all the patients were saved by destroyers and transports, but 3 unfortunately died during transfer; the ship was eventually brought into port.

H.S. "SALTA."—Mined on morning of the 10th April, 1917, just outside Havre; no patients on board; 5 officers (including the officer-in-charge), 9 nursing sisters, and 37 other ranks R.A.M.C., were lost with the ship.

H.S. "LANFRANC."—Torpedoed without warning on 17th April, 1917, at 7.30 p.m., *en route* from Havre to Southampton; 387 patients on board, including 27 German officers and 140 German other ranks; there were 326 cot cases, many of which were seriously wounded, including a number of fractured femurs and amputations; 22 British, including 2 officers, and 18 German other ranks were lost; the ship sank rapidly.

H.S. "DONEGAL."—Sunk by torpedo on 17th April, 1917.

H.S. "DOVER CASTLE."—Torpedoed without warning on 26th May, 1917, at 11 a.m.; 632 patients on board, including 29 officers; all the patients were saved, although three boats were destroyed by the first explosion. The ship was sunk by a second torpedo after being cleared.

H.S. "GOORKHA."—Mined on 10th October, 1917, off Malta, at 11.50 a.m.; 362 patients on board, including 20 officers and 17 sisters; the ship was cleared in thirty-five minutes; there were no casualties; the ship was towed into Malta.

NAVAL HOSPITAL SHIP "REWA."—Torpedoed 4th January, 1918; 4 crew (naval) were lost.

H.S. "GUILDFORD CASTLE."—Torpedoed, but reached port, 10th March, 1918.

H.S. "LLANDOVERY CASTLE."—Torpedoed 27th June, 1918; no patients on board; 88 R.A.M.C. staff and 146 crew were lost.

H.S. "WARILDA."—Torpedoed in the Channel, 3rd August, 1918; there were 471 invalids, including 439 cot cases on board; 2 officers and 113 other ranks were lost, together with 1 Q.M.A.A.C. and 1 man R.A.M.C.; the rest were cleared from the ship within an hour; the ship sank half an hour afterwards.

APPENDIX D

TABLES OF THE NUMBER OF SICK AND WOUNDED ARRIVING IN THE UNITED KINGDOM FROM EXPEDITIONARY FORCES AND GARRISONS OVERSEAS

Table I.—Sick and wounded from the Expeditionary Force, France.
A. British and Dominion sick and wounded.
B. Indian sick and wounded.
C. American sick and wounded.

Table II.—Maximum number of British and Dominion sick and wounded arriving on any one day in each month from France.

Table III.—Sick and wounded from Mediterranean theatres of war and Mediterranean garrisons.

Table IV.—Sick and wounded from the Italian Expeditionary Force.

Table V.—Sick and wounded from the Army of the Rhine.

Table VI.—Sick and wounded from Mesopotamia and Persian Gulf Expeditionary Forces.

Table VII.—Sick and wounded from West African Expeditionary Forces.

Table VIII.—Sick and wounded from the East African Expeditionary Force.

Table IX.—Sick and wounded from the North Russian ExpeditionaryForce.

Table X.—Sick and wounded from the Siberian Expeditionary Force.

Table XI.—Sick invalids from India.

Table XII.—Sick and wounded from miscellaneous garrisons overseas.

Table XIII.—Summary of Tables I to XII, showing total numbers by years from each Expeditionary Force and from garrisons overseas.

Table XIV.—Grand totals of sick and wounded arriving between August, 1914, and August, 1920.

TABLE I.

Sick and Wounded arriving each month in the United Kingdom from the Expeditionary Force, France.

A.—British and Dominion Troops.

Date.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1914.								
August	Figures not classified.						105	2,238
September ..							299	7,305
October							851	17,716
November ..							833	20,304
December ..							572	19,063
Totals ..	—	—	—	—	—	—	2,660	66,626
1915.								
January ..	424	139	—	15,898	3,011	—	563	18,909
February ..	313	135	—	10,501	3,524	—	448	14,025
March	347	401	—	9,228	9,616	—	748	18,844
April	484	478	—	5,213	9,269	—	962	14,482
May	725	1,265	—	8,709	33,286	—	1,990	41,995
June	436	492	—	7,136	11,232	—	928	18,368
July	359	322	—	6,868	6,250	—	681	13,118
August ..	489	357	—	6,597	6,672	—	846	13,269
September ..	504	606	—	10,950	15,582	—	1,110	26,532
October ..	572	965	—	10,639	23,374	—	1,537	34,013
November ..	471	254	—	15,016	4,898	—	725	19,914
December ..	453	216	—	13,920	4,855	—	669	18,775
Totals ..	5,577	5,630	—	120,675	131,569	—	11,207	252,244
1916.								
January ..	372	176	—	9,846	3,475	—	548	13,321
February ..	439	236	—	8,864	4,264	—	675	13,128
March	795	371	—	16,502	7,554	—	1,166	24,056
April	636	374	—	10,840	6,716	107	1,010	17,663
May	717	428	—	12,251	9,010	11	1,145	21,272
June	946	710	—	17,268	14,397	9	1,656	31,674
July	1,542	3,884	—	22,856	84,323	1,223	5,426	108,402
August ..	1,464	1,736	—	16,261	32,890	31	3,200	49,182
September ..	1.771	2,555	3	23,942	52,313	22	4,329	76,277
October ..	1,351	1,599	2	21,731	32,819	10	2,952	54,560
November ..	1,419	1,103	2	27,434	21,036	37	2,524	48,507
December ..	1,287	442	—	30,684	8,050	17	1,729	38,751
Totals ..	12,739	13,614	7	218,479	276,847	1,467	26,360	496,793
1917.								
January ..	1,114	343	1	29,980	6,615	6	1,458	36,601
February ..	1,250	457	—	27,887	8,981	14	1,707	36,882
March	1,425	581	3	35,588	12,253	12	2,009	45,853
April	1,433	2,190	—	28,826	39,424	20	3,623	68,270
May	1,089	1,866	—	20,386	36,766	10	2,955	57,162
June	1,248	1,640	—	18,541	26,490	10	2,888	45,041
July	1,185	988	—	19,824	18,170	1	2,173	37,995
August ..	1,467	2,291	—	27,961	57,070	9	3,758	85,040
September ..	1,235	1,426	—	21,768	27,629	11	2,661	49,408
October ..	1,337	2,530	—	27,383	49,840	18	3,867	77,241
November ..	1,358	1,630	—	34,046	36,070	9	2,988	70,125
December ..	1,142	1,393	—	30,686	27,633	3	2,535	58,322
Totals ..	15,283	17,335	4	320,876	346,941	123	32,622	667,940

TABLE I—*cont.*

Date.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1918.								
January ..	982	461	—	27,037	8,811	1	1,443	35,849
February ..	687	310	—	14,911	4,583	1	997	19,494
March	1,573	2,446	47	30,711	32,814	248	4,066	63,773
April	1,489	3,489	—	25,402	68,114	7	4,978	93,523
May	1,226	1,511	9	20,966	26,861	4	2,746	47,832
June	1,224	1,100	—	19,292	18,368	3	2,324	37,660
July	940	837	—	14,991	13,783	11	1,777	28,785
August ..	1,190	2,921	—	18,786	50,944	7	4,111	69,737
September ..	1,252	3,325	—	20,203	57,761	—	4,577	77,964
October ..	1,269	3,751	—	21,328	69,235	4	5,020	90,567
November ..	1,418	1,154	—	18,898	19,194	4	2,572	38,096
„ Repat. P/W.	107	19	—	1,377	262	—	126	1,639
December ..	1,251	231	—	23,523	3,474	2	1,482	26,999
„ Repat. P/W.	202	121	—	6,857	1,225	—	323	8,082
Totals ..	14,810	21,676	56	264,282	375,429	292	36,542	640,008
1919.								
January ..	981	132	—	33,333	2,593	4	1,113	35,930
„ Repat. P/W.	35	32	—	2,411	631	—	67	3,042
February ..	858	77	—	23,494	1,424	1	935	24,919
„ Repat. P/W.	3	—	—	241	47	—	3	288
March	861	82	—	18,314	623	—	943	18,937
„ Repat. P/W.	—	1	—	44	20	—	1	64
April	312	26	—	8,709	336	—	338	9,045
„ Repat. P/W.	—	—	—	5	7	—	—	12
May	210	25	—	5,657	188	—	235	5,845
„ Repat. P/W.	1	—	—	23	3	—	1	26
June	84	13	—	2,032	105	—	97	2,137
„ Repat. P/W.	—	—	—	5	—	—	—	5
July	133	12	—	2,277	100	—	145	2,377
August ..	49	6	—	1,838	72	—	55	1,910
September ..	56	3	—	2,443	30	—	59	2,473
October ..	73	6	—	2,553	204	—	79	2,757
November ..	162	2	—	2,345	85	—	164	2,430
December ..	68	2	—	2,130	60	—	70	2,190
Totals ..	3,886	419	—	107,854	6,528	5	4,305	114,387
1920.								
January ..	35	1	—	2,496	33	—	36	2,529
February ..	22	—	—	1,308	14	—	22	1,322
March	42	—	—	1,744	—	—	42	1,744
April	23	—	—	882	—	—	23	882
May	8	—	—	142	—	—	8	142
June	7	—	—	197	—	—	7	197
July	5	—	—	175	—	—	5	175
August ..	2	—	—	66	—	—	2	66
Totals ..	144	1	—	7,010	47	—	145	7,057

SUMMARY OF TOTALS.

1914	—	—	—	—	—	—	2,660	66,626
1915	5,577	5,630	—	120,675	131,569	—	11,207	252,244
1916	12,739	13,614	7	218,479	276,847	1,467	26,360	496,793
1917	15,283	17,335	4	320,876	346,941	123	32,622	667,940
1918	14,810	21,676	56	264,282	375,429	292	36,542	640,003
1919	3,886	419	—	107,854	6,528	5	4,305	114,387
1920	144	1	—	7,010	47	—	145	7,057
Totals ..	52,439	58,675	67	1,039,176	1,127,361	1,887	113,841	2,245,050

TABLE I—*cont.*

B.—Indian Troops.

Date.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1914.								
October ..	—	—	5	—	—	464	5	464
November ..	—	5	29	7	313	1,027	34	1,347
December ..	3	19	19	177	507	1,694	41	2,378
Totals ..	3	24	53	184	820	3,185	80	4,189
1915.								
January ..	25	12	—	913	388	—	37	1,301
February ..	16	2	18	356	55	329	36	740
March	32	26	—	1,119	1,095	—	58	2,214
April	—	—	12	148	173	—	12	321
May	24	49	—	464	2,055	—	73	2,519
June	—	—	—	—	—	—	—	—
July	2	4	—	187	237	—	6	424
August ..	—	—	—	—	—	—	—	—
September ..	4	9	—	170	282	—	13	452
October ..	5	14	—	315	704	—	19	1,019
November ..	22	4	—	779	187	—	26	966
Totals ..	130	120	30	4,451	5,176	329	280	9,956

C.—American Troops.

Date.	Officers.			Other Ranks.			Totals.		No. of Ships.
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.	
1918.									
March	3	2	1	—	—	—	6	—	—
April	9	7	—	2	—	—	16	2	—
May	13	4	—	1	—	—	17	1	—
June	9	11	—	11	—	—	20	11	—
July	33	20	2	354	214	—	55	568	—
August	37	34	13	493	762	146	84	1,401	—
September ..	27	30	4	400	608	75	61	1,083	—
October	51	199	11	771	5,193	677	261	6,641	—
November ..	57	58	2	708	1,377	8	117	2,093	—
December	32	10	3	416	212	68	45	696	—
Totals	271	375	36	3,156	8,366	974	682	12,496	—
1919.									
January	12	1	5	146	40	41	18	227	—
February	2	—	—	36	7	—	2	43	—
March	—	—	—	7	—	1	—	8	—
April	1	—	—	1	—	—	1	1	—
May	—	—	—	2	—	—	—	2	—
June	—	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—
August	—	—	—	—	—	—	—	—	—
September ..	—	—	—	—	—	—	—	—	—
October	—	—	—	—	—	—	—	—	—
November ..	—	—	—	—	—	—	—	—	—
December	2	—	—	—	—	—	2	—	—
Totals	17	1	5	192	47	42	23	281	—

TABLE II.

Maximum Number of British and Dominion Sick and Wounded arriving in the United Kingdom from the B.E.F., France, on any one day in each month.

Date.	Officers.		Other Ranks.		Totals.		No. of Ships.
	Sick.	Wounded.	Sick.	Wounded.	Officers.	Other Ranks.	
1915.							
May 14th	35	43	418	2,852	72	3,270	8
June 24th	33	32	505	1,002	65	1,507	4
July 29th	22	37	742	447	59	1,189	3
August 17th	50	28	757	649	78	1,406	4
September 30th	25	112	641	4,195	137	4,836	7
October 2nd	22	58	516	3,053	80	3,569	7
November 15th	34	26	1,385	328	60	1,713	5
December 29th	39	10	794	305	49	1,099	4
1916.							
January 6th	32	15	962	302	47	1,264	6
February 18th	71	35	1,076	516	106	1,592	6
March 17th	68	26	755	636	94	1,391	5
April 7th	70	29	1,046	434	99	1,480	4
May 3rd	24	21	934	623	45	1,557	3
June 22nd	51	26	1,447	633	77	2,080	4
July 6th	69	195	1,581	7,254	274	9,838	8
August 6th	66	84	676	2,161	150	2,837	7
September 18th	90	202	1,508	3,748	292	5,257	13
October 13th	105	102	1,198	2,181	207	3,379	8
November 2nd	139	94	2,270	1,997	233	4,267	10
December 5th	60	36	1,518	687	96	2,207	6
1917.							
January 23rd	38	15	1,948	436	53	2,384	7
February 24th	150	55	2,375	846	205	3,222	10
March 1st	88	33	2,205	718	121	2,923	9
April 16th	93	195	1,461	2,614	288	4,075	9
May 1st	51	89	941	2,062	140	3,003	9
June 10th	48	169	1,029	1,662	217	2,692	7
July 27th	41	71	1,511	1,285	112	2,796	8
August 7th	75	130	2,001	3,690	205	5,691	19
September 23rd	91	74	1,618	1,890	165	3,508	10
October 15th	44	102	1,203	2,913	146	4,116	10
November 19th	61	57	1,955	1,384	118	3,339	9
December 19th	84	67	1,748	1,257	151	3,005	9
1918.							
January 2nd	61	23	1,964	684	84	2,648	8
February 11th	60	20	1,098	262	80	1,360	4
March 29th	158	358	1,798	4,514	516	6,312	14
April 16th	44	174	1,190	3,770	218	4,960	14
May 12th	47	66	1,015	1,234	113	2,249	8
June 14th	54	64	1,124	1,076	118	2,200	5
July 28th	36	62	625	1,005	98	1,630	4
August 30th	36	150	863	4,066	186	4,929	12
September 6th	67	195	856	3,933	262	4,789	12
October 2nd	39	224	1,058	4,812	263	5,870	12
November 9th	97	109	1,216	1,574	206	2,790	10
December 8th	64	13	2,107	435	77	2,542	2

TABLE II—*cont.*

Date.	Officers.		Other Ranks.		Totals.		No. of Ships.
	Sick.	Wounded.	Sick.	Wounded.	Officers.	Other Ranks.	
1919.							
January 13th	24	11	2,547	262	35	2,809	6
February 24th	23	4	1,623	65	27	1,688	4
March 6th	46	6	1,252	48	52	1,300	4
April 2nd	15	2	1,015	25	17	1,040	2
May 8th	14	5	565	15	19	580	2
June 4th	16	—	389	13	16	402	2
July 4th	13	1	754	2	14	756	2
August 27th	21	—	563	—	21	563	1
September 6th	10	—	571	—	10	571	1
October 17th	10	—	325	20	10	345	1
November 27th	10	—	274	28	10	302	1
December 16th	6	1	288	7	7	295	1
1920.							
January 27th	13	1	328	2	14	330	1
February 16th	8	—	337	4	8	341	1
March 25th	6	—	247	—	6	247	1
April 13th	4	—	235	—	4	235	1
May 7th	8	—	142	—	8	142	1
June 23rd	3	—	101	—	3	101	1
July 9th	1	—	99	—	1	99	1
August 6th	—	—	39	—	—	39	1

TABLE III.

Sick and Wounded arriving in the United Kingdom from Mediterranean Theatres of War and Mediterranean Garrisons.

Date.	British.		Australian.		New Z.		Newfoundland.		Canadian		South African.		Naval.		Various.		Officers.			Other Ranks.				No. of Ships.
	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Sk.	Wd.	Total.	Sk.	Wd.	Unclassified.	Total.	
1915																								
February.	—	185	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	184	185	2
March ...	—	103	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	101	2	—	103	1
April	—	209	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	205	4	—	209	1
May	13	945	30	905	4	182	—	—	—	—	—	—	2	—	—	1	14	35	49	335	1,698	—	2,033	5
June	95	1,251	20	303	2	39	—	—	—	—	—	—	—	—	—	—	30	87	117	352	1,241	—	1,593	7
July	180	2,940	47	590	11	146	—	—	—	—	—	—	—	2	—	—	51	187	238	731	2,937	—	3,678	11
August ..	375	7,774	79	1,410	47	766	—	—	—	—	—	—	2	1	—	1	213	290	503	3,592	6,360	—	9,952	20
September	706	13,903	156	3,890	82	1,471	—	—	—	—	—	—	—	4	—	1	515	429	944	9,612	9,657	—	19,269	38
October..	591	11,208	147	2,541	36	738	2	17	1	1	—	1	—	—	—	—	648	129	777	10,572	3,917	17	14,506	29
November	351	8,515	72	1,325	13	257	—	43	—	4	—	—	—	—	—	—	401	35	436	8,744	1,400	—	10,144	24
December	558	11,955	25	598	7	180	1	72	3	22	—	—	—	—	—	—	544	50	594	11,664	1,163	—	12,827	22
July—Feb. 1916	31	174	2	—	1	1	—	—	—	42	4	—	—	—	—	—	37	1	38	213	1	—	217	various
Totals	2,900	59,162	578	11,562	203	3,780	3	132	4	69	4	1	4	7	—	3	2,453	1,243	3,696	46,122	28,393	201	74,716	160
1916																								
January ..	418	12,171	8	108	3	41	—	—	—	12	—	—	3	—	2	126	397	37	434	11,508	950	—	12,458	15
February.	284	5,486	—	38	2	13	1	35	—	4	1	35	—	1	1	—	245	44	289	5,060	552	—	5,612	14
March ...	139	1,258	—	3	—	2	—	3	1	6	—	6	—	—	—	3	118	22	140	1,069	212	—	1,281	6
April	154	3,620	1	38	—	24	—	—	—	—	—	15	—	—	2	9	148	9	157	3,471	235	—	3,706	11
May	181	2,018	—	6	10	100	—	5	—	—	—	27	—	—	5	11	176	20	196	2,001	166	—	2,167	10
June	212	2,969	3	102	1	9	—	—	—	—	—	11	—	—	1	81	171	46	217	2,756	416	—	3,172	17
July	153	2,734	16	311	—	8	—	1	—	—	—	3	—	—	—	—	142	27	169	2,783	274	—	3,057	9
August ..	184	1,746	21	232	—	2	—	—	—	—	—	1	—	—	—	—	194	11	205	1,933	47	1	1,981	7
September	209	3,800	5	2	3	39	—	—	—	—	—	1	—	—	—	—	209	8	217	3,712	130	—	3,842	5
October..	234	2,990	4	—	2	6	—	—	—	1	—	—	—	—	—	—	209	31	240	2,864	133	—	2,997	6
November	187	3,455	1	—	—	—	—	—	1	—	—	—	—	—	—	1	160	29	189	775	2,678	3	3,456	3
December	328	6,853	3	2	—	1	—	1	1	—	—	—	—	—	—	—	271	61	332	6,316	541	—	6,857	10
Totals	2,683	49,100	62	842	21	245	1	45	3	23	1	99	3	1	11	231	2,440	345	2785	44,248	6,334	4	50,586	113

TABLE III—*cont.*

Sick and Wounded arriving in the United Kingdom from Mediterranean Theatres of War and Mediterranean Garrisons—cont.

Date.	British.		Australian.		New Z.		Newfoundland.		Canadian		South African.		Naval.		Various.		Officers.			Other Ranks.				No. of Ships.
	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Sk.	Wd.	Total.	Sk.	Wd.	Unclassified.	Total.	
1917																								
January .	99	2,148	—	3	—	—	—	—	—	1	—	—	—	—	—	—	88	11	99	1,908	244	—	2,152	6
February.	48	595	—	—	—	—	—	—	—	—	—	—	—	—	—	—	40	8	48	537	58	—	595	2
March ...	126	2,245	—	—	—	2	—	—	—	—	—	—	—	—	1	—	99	28	127	2,016	231	—	2,247	7
May	72	1,583	—	—	—	—	—	—	—	—	—	—	—	—	—	—	68	4	72	1,500	83	—	1,583	4
June	62	1,370	—	—	—	—	—	—	—	—	—	—	—	—	—	—	48	14	62	1,204	166	—	1,370	13
July	39	2,177	—	—	—	—	—	—	—	—	—	—	—	—	—	—	33	6	39	1,988	189	—	2,177	10
August ..	49	2,154	—	—	—	—	—	—	—	—	—	—	—	—	—	—	41	8	49	1,991	163	—	2,154	8
September	48	760	—	—	—	—	—	—	—	—	—	—	—	—	—	—	43	5	48	718	42	—	760	4
November	57	898	—	—	—	—	—	—	—	—	—	—	—	—	—	—	42	15	57	641	257	—	898	3
December	165	1,870	—	—	—	—	—	—	—	—	—	—	—	—	—	—	125	40	165	1,328	542	—	1,870	6
Totals	765	15,800	—	3	—	2	—	—	—	1	—	—	—	—	1	—	627	139	766	13,831	1,975	—	15,806	63
1918																								
January..	84	1,115	—	—	—	—	—	—	—	—	—	—	—	—	—	—	67	17	84	821	294	—	1,115	8
February.	115	1,393	—	—	—	—	—	—	—	—	—	—	—	—	—	—	64	51	115	760	633	—	1,393	7
March ..	68	1,101	—	—	—	—	—	—	—	—	—	—	—	—	—	—	56	12	68	802	299	—	1,101	15
April	9	190	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	1	9	169	21	—	190	6
May	104	1,697	—	—	—	—	—	—	—	—	—	—	—	—	—	—	73	31	104	1,413	284	—	1,697	14
June	31	840	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26	5	31	657	183	—	840	23
July	102	1,549	—	—	—	—	—	—	—	—	—	—	—	—	—	—	78	24	102	1,337	212	—	1,549	11
August ..	71	1,176	—	—	—	—	—	—	—	—	—	—	—	—	—	—	62	9	71	1,058	118	—	1,176	17
September	134	1,450	—	—	—	—	—	—	—	—	—	—	—	—	—	—	109	25	134	1,264	186	—	1,450	20
October..	53	661	—	—	—	—	—	—	—	—	—	—	—	—	—	—	52	1	53	645	16	—	661	11
November	58	423	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27	31	58	401	22	—	423	12
December	288	4,289	—	—	—	—	—	—	—	—	—	—	—	—	—	—	243	45	288	4,115	174	—	4,289	26
Totals	1,117	15,884	—	—	—	—	—	—	—	—	—	—	—	—	—	—	865	252	1,117	13,442	2,442	—	15,884	170

TABLE III—*cont.*

Sick and Wounded arriving in the United Kingdom from Mediterranean Theatres of War and Mediterranean Garrisons—cont.

Date.	British.		Australian.		New Z.		Newfoundland.		Canadian.		South African.		Naval.		Various.		Officers.			Other Ranks.				No. of Ships.
	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Off.	O.R.	Sk.	Wd.	Total.	Sk.	Wd.	Unclassified.	Total.	
1919																								
January..	336	11,350	—	—	—	—	—	—	—	—	—	—	—	—	—	—	310	26	336	10,444	906	—	11,350	45
February	293	7,778	—	—	—	—	—	—	—	—	—	—	—	—	—	—	274	19	293	7,609	169	—	7,778	31
March ..	263	3,424	—	—	—	—	—	—	—	—	—	—	—	—	—	—	249	14	263	3,317	107	—	3,424	22
April	182	3,234	—	—	—	—	—	—	—	—	—	—	—	—	—	—	174	8	182	3,137	97	—	3,234	21
May	118	2,383	—	—	—	—	—	—	—	—	—	—	—	—	—	—	110	8	118	2,300	83	—	2,383	17
June	143	855	—	—	—	—	—	—	—	—	—	—	—	—	—	—	139	4	143	820	35	—	855	7
July	159	1,299	—	—	—	—	—	—	—	—	—	—	—	—	—	—	137	22	159	1,257	42	—	1,299	9
August ..	105	1,245	—	—	—	—	—	—	—	1	—	—	—	—	—	—	104	1	105	1,227	19	—	1,246	12
September	63	595	—	—	—	—	—	—	—	—	—	—	—	—	—	—	61	2	63	589	6	—	595	11
October..	56	964	—	—	—	—	—	—	—	—	—	—	—	—	—	—	55	1	56	949	15	—	964	13
November	74	1,130	—	—	—	—	—	—	—	—	—	—	—	—	—	—	73	1	74	1,122	8	—	1,130	24
December	60	985	—	—	—	—	—	—	—	—	—	—	—	—	—	—	59	1	60	978	7	—	985	14
Totals	1,852	35,242	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1,745	107	1,852	33,749	1,494	—	35,243	226
1920																								
January..	43	367	—	—	—	—	—	—	—	—	—	—	—	—	—	—	42	1	43	365	2	—	367	16
February.	14	101	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	2	14	98	3	—	101	3
March ..	44	584	—	—	—	—	—	—	—	—	—	—	—	—	—	—	41	3	44	572	12	—	584	11
April	1	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	30	—	—	30	1
May	36	305	—	—	—	—	—	—	—	—	—	—	—	—	—	—	33	3	36	290	15	—	305	2
June	25	396	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25	—	25	396	—	—	396	6
July	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August ..	22	288	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20	2	22	284	4	—	288	5
Totals	185	2,071	—	—	—	—	—	—	—	—	—	—	—	—	—	—	174	11	185	2,035	36	—	2,071	44

TABLE IV.

Sick and Wounded arriving in the United Kingdom from the Italian Expeditionary Force.

Date.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1918.								
January	42	5	—	513	67	—	47	580
February	40	5	—	468	44	—	45	512
March	15	4	—	954	44	—	19	998
April	23	8	—	258	36	—	31	294
May	13	—	—	78	9	—	13	87
June	33	10	—	333	61	—	43	394
July	22	17	—	219	118	—	39	237
August	26	6	—	357	129	—	32	486
September	47	20	—	381	167	—	67	648
October	21	16	—	234	102	—	37	336
November	46	45	—	751	360	—	91	1,111
December	22	7	—	706	251	—	29	957
Totals	350	143	—	5,252	1,388	—	493	6,640
1919.								
January	36	1	—	1,245	135	—	37	1,380
February	44	3	—	589	36	—	47	625
March	24	—	—	201	15	—	24	216
April	18	—	—	276	20	—	18	296
May	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—
August	—	—	—	4	—	—	—	4
September	—	—	—	69	—	—	—	69
October	3	1	—	197	1	—	4	198
December	3	—	—	73	1	—	3	74
Totals	128	5	—	2,654	208	—	133	2,862
1920.								
January	—	—	—	38	—	—	—	38
February	1	—	—	6	—	—	1	6
March	—	—	—	8	—	—	—	8
April	—	—	—	3	—	—	—	3
Totals	1	—	—	55	—	—	1	55
Totals	479	148	—	7,961	1,596	—	627	9,557

TABLE V.

Sick and Wounded arriving in the United Kingdom from the Army of the Rhine.

Date.	Officers.		Other Ranks.		Totals.	
	Sick.	Wounded.	Sick.	Wounded.	Officers.	Other Ranks.
1919.						
June	16	4	150	15	20	165
July	36	6	370	35	42	405
August	7	17	787	4	24	791
September	127	41	918	14	168	932
October	11	—	147	8	11	155
November	93	3	621	44	96	665
December	8	—	11	—	8	11
Totals	298	71	3,004	120	369	3,124

TABLE V—*cont.*

Date.	Officers.		Other Ranks.		Totals.	
	Sick.	Wounded.	Sick.	Wounded	Officers.	Other Ranks.
1920.						
January	18	—	531	—	18	531
February	18	1	246	4	19	250
March	—	—	—	—	—	—
April	6	—	249	—	6	249
May	8	—	171	—	8	171
June	—	—	—	—	—	—
July	—	—	31	—	—	31
August	20	—	306	13	20	319
Totals	70	1	1,534	17	71	1,551

TABLE VI.

Sick and Wounded arriving in the United Kingdom from Mesopotamia and Persian Gulf Expeditionary Forces.

Date.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1915.								
July	—	—	—	—	—	1	—	1
August	—	—	2	—	—	—	2	—
September	—	—	—	—	—	13	—	13
October	—	—	4	—	—	33	4	33
November	—	—	—	—	—	—	—	—
December	—	—	—	—	—	27	—	27
Totals	—	—	6	—	—	74	6	74
1916.								
February	—	—	—	—	—	3	—	3
March	10	14	—	36	84	—	24	120
April ..	—	—	—	6	4	—	—	10
May	16	35	—	200	240	—	51	440
June	21	64	—	318	651	—	85	969
July	10	12	—	218	233	—	22	451
August	2	—	—	125	26	—	2	151
September	10	3	—	623	137	—	13	760
October	9	—	—	524	44	—	9	568
November	3	2	—	139	13	—	5	152
December	25	6	—	697	39	—	31	736
Totals	106	136	—	2,886	1,471	3	242	4,360
1917.								
January	27	2	—	286	18	—	29	304
February	7	1	—	39	2	—	8	41
March	12	3	—	212	46	—	15	258
May	3	—	—	—	—	—	3	—
June	22	8	—	96	55	—	30	151
July	5	7	—	22	53	—	12	75
August	16	11	—	5	—	—	27	5
September	9	8	—	121	180	—	17	301
October	14	1	—	121	26	—	15	147
November	26	7	—	128	89	—	33	217
December	22	3	—	404	109	—	25	513
Totals	163	51	—	1,434	578	—	214	2,012

TABLE VI—*cont.*

Date.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1918.								
January	3	1	—	—	—	—	4	—
February	2	—	—	1	—	—	2	1
March	22	2	—	93	16	—	24	109
April	11	2	—	356	42	—	13	398
May	13	1	—	61	14	—	14	75
June	16	—	—	154	6	—	16	160
July	6	—	—	12	—	—	6	12
August	21	3	—	108	19	—	24	127
September	16	—	—	181	4	—	16	185
October	5	—	—	20	—	—	5	20
November	10	—	—	20	—	—	10	20
December	1	—	—	118	—	—	1	118
Totals	126	9	—	1,124	101	—	135	1,225
1919.								
January	45	4	—	907	115	—	49	1,022
February	25	—	—	121	6	—	25	127
March	88	10	—	1,057	46	—	98	1,103
April	66	1	—	1,988	76	—	67	2,064
May	29	7	—	454	25	—	36	479
June	17	—	—	374	3	—	17	377
July	13	—	—	412	4	—	13	416
August	19	—	—	52	1	—	19	53
September	23	—	—	102	3	—	23	105
October	14	—	—	299	6	—	14	305
November	—	—	—	56	—	—	—	56
December	—	—	—	30	—	—	—	30
Totals	339	22	—	5,852	285	—	361	6,137
1920.								
January	1	—	—	16	—	—	1	16
February	17	1	—	42	—	—	18	42
March	1	—	—	20	—	—	1	20
May	2	—	—	21	—	—	2	21
August	2	—	—	22	—	—	2	22
Totals	23	1	—	121	—	—	24	121

TABLE VII.

Sick and Wounded arriving in the United Kingdom from West African Expeditionary Forces.

Date.	Officers.	Other Ranks.	Remarks.
1915.			
July	—	2	
August	21*	9	*20 on sick leave.
September	—	1	
October	2*	5	*2 ,,
November	2	3	
December	5*	6	*5 ,,
Totals	30	26	

TABLE VII—*cont.*

Date.	Officers.	Other Ranks.	Remarks.
1916.			
February	1	13*	*7 on sick leave.
March	8*	12	*8 ,,
April	23*	3	*23 ,,
May	8*	2	*8 ,,
June	4*	3	*4 ,,
July	7*	46†	*3 ,,
			†1 ,,
August	4	1	*4 ,,
September	—	1	—
Totals	55	81	—
1917.			
January	24*	45†	*11 on sick leave.
			†1 ,,
March	1	—	—
June	3	1	—
Totals	28	46	—
1918.			
March	1	—	—

TABLE VIII.

Sick and Wounded arriving in the United Kingdom from the East African Expeditionary Force.

Date.	Officers.	Other Ranks.	Remarks.
1915.			
September	—	9	—
December	—	2	—
Totals	—	11	—
1916.			
January	—	23	—
May	9	32	—
June	2	3	—
July	4*	—	*3 on sick leave.
August	6*	3	*4 ,,
September	10*	51	*10 ,,
October	13*	159	*12 ,,
November	9*	62	*3 ,,
December	6	1	—
Totals	59	334	—

TABLE VIII—*cont.*

Date.	Officers.	Other Ranks.	Remarks.
1917.			
January	32*	306†	*4 on sick leave. †1 ,,
February	4	5	—
March	10	349	—
April	15	187	—
May	27	215	—
June	25	656	—
July	18	286	—
August	9	612	—
September	27	496	—
October	31	170	—
November	29	777	—
December	30	573	—
Totals	257	4,632	—
1918.			
January	37	141	—
February	23	—	—
March	99	1,945	—
April	12	727	—
May	40	379	—
June	6	142	—
July	—	—	—
August	45	416	—
September	—	—	—
October	3	1	—
November	11	9	—
December	—	198	—
Totals	276	3,958	—
1919.			
January	20	26	—
February	36	36	—
March	25	343	—
April	17	51	—
May	12	46	—
June	1	20	—
July	—	—	—
August	1	—	—
September	5	54	—
October	—	4	—
Totals	117	580	—

TABLE IX.

Sick and Wounded arriving in the United Kingdom from the North Russian Expeditionary Force.

Date.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1918.								
October ..	5	3	—	5	—	—	8	5
1919.								
January ..	1	—	—	26	2	—	1	28
February ..	25	3	—	269	6	—	28	275
March ..	9	1	—	20	—	—	10	20
April ..	3	—	—	71	4	—	3	75
May ..	13	3	—	70	5	—	16	75
June ..	35	—	—	—	—	651	35	651
July ..	9	3	—	41	13	23	12	77
August ..	39	21	—	306	114	185	60	605
September..	—	—	2	—	—	21	2	21
October ..	10	10	26	118	66	191	46	375
Totals ..	144	41	28	921	210	1,071	213	2,202

TABLE X.

Sick and Wounded arriving in the United Kingdom from the Siberian Expeditionary Force.

Date.	Officers.		Other Ranks.		Totals.	
	Sick.	Wounded.	Sick.	Wounded.	Officers.	Other Ranks.
1919.						
April	10	—	554	6	10	560
May	2	—	6	—	2	6
June	6	—	189	10	6	199
July	1	—	59	1	1	60
Totals ..	19	—	808	17	19	825

TABLE XI.

Sick Invalids arriving in the United Kingdom from India.

Date.	Officers.	Other Ranks.
1915.		
July	—	13
August	—	—
September	—	—
October	—	141
November	—	33
December	1	243
Totals	1	430
1916.		
January	—	47
February	—	2
March	13	224
April	4	5
May	15	67
June	6	92
July	8	32
August	1	10
September	3	203
October	—	89
November	3	71
December	15	297
Totals	68	1,139
1917.		
January	17	182
February	16	54
March	27	200
April	—	—
May	—	—
June	17	268
July	1	133
August	3	245
September	13	91
October	2	33
November	19	269
December	24	315
Totals	139	1,790
1918.		
January	—	—
February	—	—
March	19	149
April	26	427
May	12	26
June	43	351
July	8	102
August	11	150
September	25	241
October	26	40
November	—	—
December	15	71
Totals	185	1,557

TABLE XI—*cont.*

Date.	Officers.	Other Ranks.
1919.		
January	61	219
February	33	109
March	85	983
April	76	1,966
May	59	2,519
June	37	1,563
July	45	581
August	74	868
September	39	374
October	55	586
November	86	724
December	17	221
Totals	667	10,743
1920.		
January	39	181
February	24	322
March	—	—
April	11	402
May	41	376
June	1	4
July	13	301
August	—	43
Totals	129	1,629

TABLE XII.

Sick and Wounded arriving in the United Kingdom from miscellaneous Garrisons overseas, not included in other tables.

Month.	Officers.	Other Ranks.	Remarks.
1916.			
May	—	17	—
June	2	58	—
July	*6	93	*2 Officers on Sick Leave.
August	*3	51	*2 ,,
September	*3	9	*2 ,,
October	*2	53	*2 ,,
November	—	29	
December	*2	†30	*2 ,, †1 ,,
Totals	18	340	—

TABLE XII—*cont.*

Month.	Officers.	Other Ranks.	Remarks.
1917.			
January	*3	29	*2 Officers on Sick Leave.
February	2	17	—
March	—	63	—
April	1	21	—
May	1	45	—
June	—	63	—
July	9	135	—
August	4	71	—
September	—	17	—
October	20	77	—
November	1	7	—
December	2	23	—
Totals	43	568	—
1918.			
February	—	1	—
March	—	5	—
May	4	9	—
June	2	—	—
Totals	6	15	—

TABLE XIII.

Summarized Totals of Sick and Wounded Officers and other Ranks, arriving in the United Kingdom from each Expeditionary Force and Garrisons Overseas yearly, from August, 1914, *to August,* 1920.

Expeditionary Force, etc.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1914.								
France	—	—	2,660	—	—	66,626	2,660	66,626
Indians from France	3	24	53	184	820	3,185	80	4,189
Totals	3	24	2,713	184	820	69,811	2,740	70,815
1915.								
France	5,577	5,630	—	120,675	131,569	—	11,207	252,244
Indians from France	130	120	30	4,451	5,176	329	280	9,956
Mediterranean ..	2,453	1,243	—	46,122	28,393	201	3,696	74,716
Persian Gulf and Mesopotamia	—	—	6	—	—	74	6	74
Sick Invalids from India	—	—	1	—	—	430	1	430
West Africa	—	—	30	—	—	26	30	26
East Africa	—	—	—	—	—	11	—	11
Totals	8,160	6,993	67	171,248	165,138	1,071	15,220	337,457

TABLE. XIII—*cont.*

Expeditionary Force, etc.	Officers.			Other Ranks.			Totals.	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1916.								
France	12,739	13,614	7	218,479	276,847	1,467	26,360	496,793
Mediterranean ..	2,440	345	—	44,248	6,334	4	2,785	50,586
Persian Gulf and Mesopotamia	106	136	—	2,886	1,471	3	242	4,360
Sick Invalids from India	—	—	68	—	—	1,139	68	1,139
West Africa	—	—	55	—	—	81	55	81
East Africa	—	—	59	—	—	334	59	334
Miscellaneous ..	—	—	18	—	—	340	18	340
Totals	15,285	14,095	207	265,613	284,652	3,368	29,587	553,633
1917.								
France	15,283	17,335	4	320,876	346,941	123	32,622	667,940
Mediterranean ..	627	139	—	13,831	1,975	—	766	15,806
Persian Gulf and Mesopotamia	163	51	—	1,434	578	—	214	2,012
Sick Invalids from India	—	—	139	—	—	1,790	139	1,790
West Africa	—	—	28	—	—	46	28	46
East Africa	—	—	257	—	—	4,632	257	4,632
Miscellaneous ..	—	—	43	—	—	568	43	568
Totals	16,073	17,525	471	336,141	349,494	7,159	34,069	692,794
1918.								
France	14,810	21,676	56	264,282	375,429	292	36,542	640,003
Mediterranean ..	865	252	—	13,442	2,442	—	1,117	15,884
Persian Gulf and Mesopotamia	126	9	—	1,124	101	—	135	1,225
Sick Invalids from India	—	—	185	—	—	1,557	185	1,557
West Africa	—	—	1	—	—	—	1	—
East Africa	—	—	276	—	—	3,958	276	3,958
Americans from France	271	375	36	3,156	8,366	974	682	12,496
Italy	350	143	—	5,252	1,388	—	493	6,640
North Russia ..	5	3	—	5	—	—	8	5
Miscellaneous ..	—	—	6	—	—	15	6	15
Totals	16,427	22,458	560	287,261	387,726	6,796	39,445	681,783
1919.								
France	3,886	419	—	107,854	6,528	5	4,305	114,387
Mediterranean ..	1,745	107	—	33,749	1,494	—	1,852	35,243
Persian Gulf and Mesopotamia	339	22	—	5,852	285	—	361	6,137
Sick Invalids from India	—	—	667	—	—	10,743	667	10,743
East Africa	—	—	117	—	—	580	117	580
Americans from France	17	1	5	192	47	42	23	281
Italy	128	5	—	2,654	208	—	133	2,862
North Russia ..	144	41	28	921	210	1,071	213	2,202
Siberia	19	—	—	808	17	—	19	825
Army of the Rhine ..	298	71	—	3,004	120	—	369	3,124
Totals	6,576	666	817	155,034	8,909	12,441	8,059	176,384
1920. (To August only)								
France	144	1	—	7,010	47	—	145	7,057
Mediterranean ..	174	11	—	2,035	36	—	185	2,071
Persian Gulf and Mesopotamia	23	1	—	121	—	—	24	121
Sick Invalids from India	—	—	129	—	—	1,629	129	1,629
Italy	1	—	—	55	—	—	1	55
Army of the Rhine ..	70	1	—	1,534	17	—	71	1,551
Totals	412	14	129	10,755	100	1,629	555	12,484

TABLE XIV.

Grand Totals of Sick and Wounded arriving in the United Kingdom from August, 1914, *to August,* 1920.

Year.	Officers.			Other Ranks.			Totals	
	Sick.	Wounded.	Unclassified.	Sick.	Wounded.	Unclassified.	Officers.	Other Ranks.
1914 ..	3	24	2,713	184	820	69,811	2,740	70,815
1915 ..	8,160	6,993	67	171,248	165,138	1,071	15,220	337,457
1916 ..	15,285	14,095	207	265,613	284,652	3,368	29,587	553,633
1917 ..	16,073	17,525	471	336,141	349,494	7,159	34,069	692,794
1918 ..	16,427	22,458	560	287,261	387,726	6,796	39,445	681,783
1919 ..	6,576	666	817	155,034	8,909	12,441	8,059	176,384
1920 .. (Aug.)	412	14	129	10,755	100	1,629	555	12,484
Grand Totals	62,936	61,775	4,964	1,226,236	1,196,839	102,275	129,675	2,525,350

APPENDIX E

TABLES OF MEDICAL AND SURGICAL EQUIPMENT AND SUPPLIES

Table I.—Personnel and floor space of Army Medical Stores and Medical Store Depôts in the United Kingdom.

Table II.—Principal medical stores of which a six months' supply is maintained. Units kept packed and ready for issue.

Table III.—Indents received in the War Office.

Table IV.—Surgical dressings issued.

Table V.—Number of cases and bales of medical stores shipped overseas.

Table VI.—Hospital ships and transports equipped with medical and surgical stores.

A. Hospital ships.
B. Transports.

Table VII.—Field Medical Equipment purchased.

Table VIII.—Field Medical Equipment issued.

Table IX.—Special Mobile Laboratories supplied to Armies overseas.

Table X.—List of X-ray specifications drawn up by the Inter-Departmental Advisory Committee.

Table XI.—X-ray Outfits issued.

Table XII.—Field Service X-ray Outfit specification.

Table XIII.—Dental Outfits issued.

Table XIV.—Field Dental Outfit specification.

Table XV.—Dental Anæsthetic Outfit specification.

Table XVI.—Dental Mechanical Outfit specification.

Table XVII.—Special splints and crutches purchased.

Table XVIII.—Mechano-therapy Equipment for Military Orthopædic Hospitals.

Table XIX.—Anæsthetic Outfit for an Operating Theatre in a Military Hospital.

Table XX.—Cholera Unit—composition of.

Table XXI.—Principal Vaccines supplied.

Table XXII.—Principal Sera supplied.

Table XXIII.—Some inventions and new methods of treatment.

Table XXIV.—List of Army Council Instructions issued regarding economy and prevention of waste in the use of medical and surgical supplies and equipment.

TABLE I.

Personnel and Floor Space of Army Medical Stores and Medical Store Depôts in the United Kingdom at the time of the Armistice.

Unit.	Officers	Store-keepers	Assistant Store-keepers.		Clerks.		Store-men.	Store-women	Totals.	Floor space sq. ft.	Remarks.
			Male.	Female	Male.	Female.					
Army Medical Store, Woolwich	2	7	11	—	2	11	46*	33	112	66,922	*Includes 1 cutler, 2 carpenters, 1 watchman.
Army Medical Reserve Store, Woolwich, and its branches.	3	6	8	—	1	10	71	29	128	99,059	
Base Depôt Medical Store, Edinburgh.	1	1	—	5	—	4	2	—	13	8,466	
Base Depôt Medical Store, Dublin.	1	—	1	1	2	6	2	2	15	5,040	
Base Depôt Medical Store, Southampton.	1	3	2	—	1	—	12	—	19	8,383	
Base Depôt Medical Store, York.	2	4	—	—	3	4	4	2	19	17,280	
Base Depôt Medical Store, Cosham.	1	—	1	—	2	2	—	1	7	864	
Base Depôt Medical Store, Bristol.	1	—	—	—	1	4	5	—	11	7,000	
Base Depôt Medical Store, Liverpool.	1	2	—	—	1	—	6	—	10	9,750	
Base Depôt Medical Store, Northampton.	1	1	—	—	—	1	7	—	10	5,754	
Base Depôt Medical Store, Reading.	1	—	1	—	2	—	6	—	10	6,400	
Base Depôt Medical Store, Golborne.	1	3	3	—	2	3	2	13	27	84,409	
Army Medical Store, Dover	—	1	1	—	—	2	—	2	6	1,400	
Medical Mobilization Store, Aldershot.	1	1	1	—	1	—	2	—	6	1,622	
Totals	17	29	29	6	18	47	165	82	393	322,349	

TABLE II.

Principal Medical Stores of which a Six Months' Supply was maintained.

Field Medical Equipment and contents.
Shell Dressings and Haversacks.
Cases, Water Testing, Poisons.
Cases, Water Testing, Sterilization.
Camp Medicine Boxes.
Surgical Dressings.
Compressed Dressings.
Sterile Dressings for transports.
Surgical Instruments.
Sterilizers.
Syringes.
Cylinders of Oxygen and Nitrous Oxide.
N_2O Apparatus.
Operation Room Furniture.
Hospital Operation Tables.
Field Operation Tables.
Splints.
Crutches.
Tourniquets.
Catgut.
Brushes, Nail.
Selected Drugs, such as Salvarsan and Aspirin.
Tablets.
Rubber goods, such as Air-beds, Water-beds and Pluviusin.
Drainage tubing.
X-ray Outfits and X-ray Tubes.
Microscopes.
Thermometers.
Enamelled ironware.
Dental Outfits.
Pathological Outfits and Glassware.

Medical and Surgical Stores for the following Units were also kept packed and ready for immediate issue :—

2 Base Depôts of Medical Stores.
2 Advanced Depôts of Medical Stores.
12 General Hospitals.
20 " Bowlby " Outfits for Casualty Clearing Stations.
6 Hospital Ships.
8 Transports.
150 Tanks.

TABLE III.

Indents received in the War Office from 4th August, 1914, to 3rd August, 1919.

Home	91,812
Hospital Ships	145
Royal Air Force	4,928
Ministry of National Service	224
Ministry of Pensions	37
France	6,411
Italy	192
Gibraltar	120
Malta	210
Mudros	104
Salonika	575
Belgium	8
North Russia	127
South Russia	14
Turkey	44
Egypt	1,082
Mesopotamia	178
India	457
East Africa	116
West Africa	26
South Africa	331
Australian Imperial Forces	71
U.S. America	61
Sales and Disposals	77
Total	107,350

TABLE IV.

Surgical Dressings (including compressed Dressings) issued from 4th August, 1914, to 3rd August, 1919.

Destination.	Bandages.			Gauze.		Lint.		Cotton-wool.		Tissue Cotton-wool and Gauze. lbs.
	Roller.	Flannel.	Triangular.	Plain. Yards.	Medicated. Yards.	Plain. lbs.	Medicated. lbs.	Plain. lbs.	Medicated. lbs.	
Home	24,845,764	335,464	1,156,615	36,950,746	9,565,652	1,613,130	1,479,817	3,313,427	422,851	159,127
France	50,678,198	378,362	6,169,986	66,972,627	8,743,119	1,203,750	873,420	3,115,311	130,941	204,098
Mudros	1,550,923	13,500	186,000	504,784	1,541,524	86,040	42,430	134,887	11,950	600
Salonika	5,279,134	20,000	174,860	3,720,908	1,063,044	108,123	103,112	392,736	14,582	12,300
Malta	778,273	21,084	29,700	1,153,882	636,092	36,000	39,700	105,678	33,100	25,640
Russia	1,614,668	44,000	112,250	2,311,020	842,100	35,025	6,800	267,274	29,000	4,200
Egypt	12,806,448	50,000	414,380	7,463,271	5,421,556	293,100	245,000	522,557	84,646	27,872
Mesopotamia ..	805,787	1,500	152,000	737,686	750,354	11,810	500	113,814	23,016	400
India	608,410	18,050	26,790	329,784	504,648	33,670	40,798	34,632	9,834	600
East Africa	398,200	8,500	64,700	284,936	402,770	38,200	27,100	38,150	625	—
South Africa ..	220,504	938	600	44,262	101,312	14,650	13,048	13,000	605	450
Hospital Ships ..										
Steamers	617,900	15,624	60,000	658,468	829,427	28,148	18,964	60,843	89,946	1,770
Barges										
Miscellaneous ..	3,453,958	29,022	148,190	2,852,532	299,492	52,280	120,223	282,180	32,807	2,160
Totals	103,658,167	936,044	8,696,071	123,984,906	30,701,090	3,553,926	3,010,912	8,394,489	883,903	439,217

TABLE V.

Number of Cases and Bales of Medical Stores shipped Overseas from 4th August, 1914, to 3rd August, 1919.
(Exclusive of initial Medical Equipment taken by Units.)

	France.	Cologne	Mudros	Salonika.	Constantinople.	Malta.	Italy.	North Russia.	South Russia.	Egypt.	Basra.	India.	East Africa.	West Africa.	South Africa.	Various.	Total.
1914.																	
August	—	—	—	—	—	—	—	—	—	—	—	—	—	2	10	—	12
September	195	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	196
October	1,138	—	—	—	—	—	—	—	—	—	—	—	—	3	62	—	1,203
November	2,263	—	—	—	—	—	—	—	—	162	—	—	—	—	—	—	2,425
December	1,905	—	—	—	—	9	—	—	—	476	—	—	—	—	—	—	2,390
1915.																	
January	2,868	—	—	—	—	—	—	—	—	116	—	—	—	—	—	—	2,984
February	3,058	—	—	—	—	—	—	—	—	216	—	—	—	—	—	—	3,274
March	3,981	—	—	—	—	—	—	—	—	968	—	—	—	—	—	—	4,949
April	4,863	—	—	—	—	—	—	—	—	606	—	—	—	5	—	—	5,474
May	5,189	—	214	—	—	95	—	—	—	1,645	—	—	—	26	—	—	7,169
June	5,539	—	295	—	—	356	—	—	—	1,043	—	—	—	—	—	—	7,233
July	5,166	—	1,850	—	—	543	—	—	—	1,763	—	—	—	—	—	—	9,322
August	8,275	—	1,370	—	—	1,445	—	—	—	2,209	—	—	—	—	—	—	13,299
September	9,280	—	684	—	—	441	—	—	—	2,313	—	—	—	6	—	—	12,724
October	8,583	—	1,788	363	—	964	—	—	—	1,204	—	—	—	—	—	—	12,902
November	8,080	—	2,017	254	—	596	—	—	—	1,156	—	—	—	2	—	—	12,105
December	2,872	—	756	324	—	943	—	—	—	1,089	—	—	—	—	—	—	5,984
1916.																	
January	2,160	—	808	440	—	969	—	—	—	787	—	—	—	7	1	—	5,172
February	1,930	—	—	149	—	1,109	—	—	—	1,192	—	—	—	2	—	—	4,382
March	3,803	—	—	138	—	383	—	—	—	1,614	—	—	—	3	—	—	5,941
April	4,061	—	—	8	—	136	—	—	—	370	—	55	139	8	—	—	4,777
May	7,048	—	—	30	—	6	—	—	—	499	148	—	688	7	—	—	8,426
June	7,050	—	—	70	—	28	—	—	—	525	24	—	43	47	—	—	7,787
July	14,828	—	—	39	—	45	—	—	—	1,147	106	—	46	1	—	—	16,212
August	6,864	—	—	1,273	—	158	—	—	—	1,120	202	60	—	4	—	—	9,681
September	8,766	—	—	100	—	102	—	—	—	1,701	343	83	616	4	—	—	11,715
October	9,716	—	—	237	—	136	—	—	—	1,494	546	68	8	—	6	—	12,211
November	6,930	—	—	145	—	217	—	—	—	1,175	370	31	—	—	52	—	8,920
December	5,973	—	—	737	—	—	—	—	—	797	364	—	427	—	—	—	8,298

TABLE V—*contd.*

	France.	Cologne	Mudros	Salonika.	Constantinople.	Malta.	Italy.	North Russia.	South Russia.	Egypt.	Basra.	India.	East Africa.	West Africa.	South Africa.	Various.	Total.
1917																	
January	4,559	—	—	1,168	—	101	—	—	—	1,897	218	—	149	41	353	—	8,486
February	9,465	—	—	1,594	—	332	—	—	—	449	285	200	7	2	7	—	12,341
March	14,267	—	—	1,126	—	92	—	—	—	712	473	536	150	—	10	—	17,366
April	8,729	—	—	1,067	—	137	—	—	—	120	49	554	825	4	21	—	11,506
May	11,877	—	—	2,578	—	87	—	—	—	720	—	403	374	—	188	—	16,227
June	15,594	—	—	4,150	—	68	—	—	—	1,902	691	649	357	22	4	—	23,437
July	15,360	—	—	2,468	—	73	—	—	—	4,222	43	315	70	56	17	—	19,624
August	7,273	—	—	2,785	—	178	—	—	—	3,044	158	92	1,075	—	32	—	14,637
September	7,474	—	—	2,265	—	2	121	—	—	5,326	98	229	190	—	30	—	15,735
October	3,265	—	—	978	—	40	157	—	—	3,334	25	774	—	—	—	—	8,573
November	6,775	—	—	1,350	—	75	182	—	—	4,383	102	752	220	—	342	—	14,181
December	8,349	—	—	1,744	—	78	276	—	—	3,042	84	962	187	—	—	—	14,722
1918.																	
January	6,134	—	—	3,183	—	37	578	—	—	2,648	15	109	2,190	—	396	—	15,290
February	6,800	—	—	384	—	63	1,439	—	—	5,126	85	74	212	—	—	—	14,183
March	8,725	—	—	1,000	—	19	1,855	—	—	1,538	41	312	725	—	4	—	14,219
April	14,760	—	—	777	—	54	510	—	—	621	46	21	695	—	—	—	17,484
May	5,223	—	—	495	—	40	124	—	—	744	10	103	30	—	240	—	7,009
June	9,469	—	—	288	—	69	217	—	—	5,226	111	135	—	—	—	—	15,515
July	6,093	—	—	764	—	19	229	—	—	329	—	103	259	—	300	—	8,096
August	12,826	—	—	399	—	97	372	—	—	328	51	30	1	—	1	—	14,105
September	10,642	—	—	726	—	10	166	7,145	—	229	16	26	75	—	2	—	19,037
October	8,568	—	—	988	—	53	373	22	—	154	20	120	3	—	2	—	10,303
November	5,819	—	—	987	—	138	405	—	—	967	38	137	1	—	—	—	8,492
December	1,356	—	—	118	—	71	86	435	—	295	14	140	—	—	2	—	2,517
1919.																	
January	1,388	—	—	64	—	60	79	—	—	604	16	122	15	—	—	—	2,348
February	1,325	—	—	242	—	—	12	129	—	126	—	31	—	—	42	—	1,907
March	1,882	—	—	37	—	—	34	467	34	716	13	11	1	—	92	—	3,287
April	659	540	—	—	4	—	28	81	—	531	18	25	—	—	—	—	1,886
May	439	167	—	—	5	8	45	2,475	2,254	486	3	12	—	—	—	—	5,894
June	88	4	—	—	10	2	3	3,469	573	317	24	57	—	—	—	—	4,547
July	22	—	—	—	62	2	—	1,374	—	237	2	3	10	—	—	11	1,723
August 3rd	2	3	—	—	—	—	17	—	1,423	—	—	—	—	—	—	—	1,445
Totals	367,591	714	9,782	38,032	81	10,686	7,308	15,597	4,284	74,760	4,852	7,334	9,788	252	2,217	11	553,289

Total number of cases and bales shipped 553,289, amounting to about 84,200 shipping tons.

TABLE VI.

Number of Hospital Ships and Transports equipped with Medical and Surgical Stores, 3rd August, 1914, to 3rd August, 1919.

A.—Hospital Ships.

Year.	Number equipped at								
	Southampton.	London.	Liverpool.	Portland.	Newcastle.	Glasgow	Belfast.	Alexandria.	Total.
1914 ..	6	1	—	—	—	—	—	—	7
1915 ..	9	15	2	1	1	1	3	7	39
1916 ..	2	7	3	—	—	—	—	—	12
1917 ..	2	1	5	—	—	—	—	—	8
1918 ..	—	—	—	—	—	—	—	—	—
1919 ..	—	—	—	—	—	—	—	—	—
Totals ..	19	24	10	1	1	1	3	7	66

B.—Transports.

Year.	Number equipped at												
	Southampton.	Devonport.	Avonmouth.	Liverpool.	Bristol.	Cardiff.	Newcastle-on-Tyne.	Dundee.	Glasgow.	Leith.	Gravesend.	London Docks	Total.
1914	44	—	—	—	—	—	—	—	—	—	—	—	44
1915	16	119	56	22	—	—	—	—	—	—	—	—	213
1916	9	129	14	61	—	—	—	—	—	—	—	—	213
1917	—	66	1	34	41	—	—	—	—	—	—	—	142
1918	10	12	—	7	36	—	—	4	2	13	1	1	86
1919	13	5	—	15	10	1	3	—	2	7	7	11	74
Totals ..	92	331	71	139	87	1	3	4	4	20	8	12	772

TABLE VII.

Field Medical Equipment purchased, 4th August, 1914, to 3rd August, 1919.

	Bottles, Water. No.	Companions, Medical. No.	Haversacks, Surgical. No.	Panniers, Field Medical. Pairs.	Panniers Reserve Field Medical. Pairs.	Panniers Field Surgical. Pairs.	Boxes, Field Fracture. No.	Boxes, Reserve Dressings. No.	Haversacks with Shell Dressings. No.	Tables, Operation, Portable. No.	Cases, Water Testing.	
											Poisons. No.	Sterilization. No.
Delivered at Army Medical Store, Woolwich.	34,093	11,899	22,528	5,372†	759	1865‡	2,196	6,882	76,115	1,915	10,721	10,225*

* Includes 1,363 transferred from the Ordnance Department.
† 266 No. 1 Field Medical Panniers were purchased in addition.
‡ 49 No. 1 Field Surgical Panniers were purchased in addition.

TABLE VIII.

Field Medical Equipment issued during the period 4th August, 1914, to 3rd August, 1919.

Destination.	Bottles, Water. No.	Companions, Medical No.	Haversacks, Surgical. No.	Panniers, Field Medical. Pairs.	Panniers, Reserve Field Medical. Pairs.	Panniers, Field Surgical. Pairs.	Field Fracture Boxes No.	Reserve Dressing Boxes. No.	Haversacks with Shell Dressings. No.	Shell Dressings. No.	Tables, Operating, portable. No.	Cases, Water testing. Poisons. No.	Cases, Water testing. Sterilization. No.	Cases, tablet, medicine. No.	Surgical Saddle Bags. Pairs.	General Fracture Boxes. No.	Emergency Boxes. Pairs.	Medicine Chests. No.	Iodine Ampoules. No.
Home ..	18,161	4,870	8,814	4,703	690	1,295	1,568	3,983	16,994	426,440	629	2,023	2,899	106	60	191	1,031	116	3,409,672
France ..	12,771	3,673	7,467	1,300	233	433	321	1,574	18,388	15,419,460	356	3,480	3,047	1	20	25	—	1	6,839,800
Mudros ..	470	189	454	56	16	17	205	310	10,434	120,000	1	—	—	2	—	—	—	—	455,000
Salonica ..	1,684	421	655	176	50	99	146	156	1,120	266,000	30	191	395	—	—	20	—	—	530,000
Malta ..	16	8	8	40	—	36	26	54	12	2,000	17	6	10	—	—	4	—	—	2,000
Gibraltar ..	—	—	—	—	—	—	—	—	—	300	—	—	—	—	—	—	—	—	—
Russia ..	1,185	536	638	349	192	222	46	247	1,743	17,000	61	294	373	1	—	21	200	—	10,456
Italy ..	—	20	50	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Egypt ..	2,644	1,001	1,275	497	98	176	122	595	1,768	108,000	94	781	650	—	—	3	—	—	552,418
Mesopotamia	128	24	48	12	6	12	13	14	60	2,000	29	—	—	—	—	—	—	—	10,000
India ..	219	207	106	178	20	20	32	66	100	65,000	34	6	—	—	—	8	—	—	100,272
East Africa	157	208	276	31	10	2	14	6	124	13,000	3	—	—	—	—	—	—	—	20,000
South Africa	285	104	252	155	10	58	24	58	225	2,000	—	43	43	—	21	3	—	5	15,000
West Africa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Miscellaneous	145	67	125	97	16	25	19	31	256	35,418	77	70	152	17	—	42	10	31	24,000
	37,865	11,328	20,168	7,594	1,341	2,395	2,536	7,094	51,224	16,476,618	1,332	6,894	7,569	127	101	317	1,241	153	11,968,618

TABLE IX.

Special Mobile Laboratories supplied to Armies Overseas between 4th August, 1914, and 3rd August, 1919.

Laboratories.	France.	Salonika	Italy.	Egypt.	Meso-potamia	East Africa.	Total.
Bacteriological	18	3*	—	3	—	1*	25
Hygiene ..	7	1*	1	—	—	1*	10
X-ray ..	10†	2	—	—	2	—	14
Dental ..	5	—	—	—	—	—	5
Eye-Magnet ..	1	—	—	—	—	—	1
							55

* Pack Transport Laboratories—the remainder were on motor chassis.
† 2 of these X-ray Laboratories were constructed in France.

TABLE X.

List of X-ray Specifications drawn up by the Inter-departmental Advisory Committee.

Dry Tungsten-Target X-ray Tube.
Hot Cathode X-ray Tube.
Valve Tube.
Induction Coil, Box Type.
Induction Coil, Bobbin Type.
Shelf, for Induction Coil.
Motor driven Interrupter.
X-ray Switchboard, Wall Type.
X-ray Switch Table.
Milliamperemeter, with-4 in. dial, for X-ray purposes.
Milliamperemeter, Sector Type, for X-ray purposes.
Support for Milliamperemeter.
X-ray Table, Small, Hospital Type, A.M.D. pattern.
X-ray Table, Large, Hosp. Type.
X-ray Table, Plain.
A.M.D. Grid Localizer.
Localizing Skin Marker.
Heavy Metal Tube Stand.
Portable Wooden Tube Stand.
Stereoscope.
Portable Stereoscope.
Fluorescent Screen, 12 in. by 9 in.
Fluorescent Screen, with Localizing Pointers.
Fluorescent Screen, 16 in. by 16 in.
Protective Handles, for Fluorescent Screen.
Fluorescope.
Cassette, for 12 in. by 10 in. Intensifying Screen.
Cassette, for 15 in. by 12 in. Intensifying Screen.
Plate Changing Box.
Protective Apron, large.
Protective Apron, small.
Protective Rubber Gloves, ordinary.
Protective Rubber Gloves, with gauntlets.
Viewing Box, 12 in. by 10 in.
Viewing Box, 15 in. by 12 in.
Tube Rack.
Head-rest, for eye and head radiography.
Transport Cases.
Protective Lead Rubber, 1·6 mm. thick.
Protective Lead Rubber, 2·6 mm. thick.
Protective Lead Glass.
Grid Localizer, A.M.D. Pattern.
Discharging Pillar and Socket.
Plugs.
Electrical Connections of X-ray Electrical Unit.
X-ray Tube Holder and Stereoscopic Slide.

TABLE XI.

X-ray Outfits issued, 4th August, 1914, to 3rd August, 1919.

Type of Outfit.	Home	France	Malta	Mudros	Salonika.	Mediterranean	Serbia	North Russia	Holland British P. of W.	Egypt	Mesopotamia.	India Office.	East Africa	China	Colonial Governments.	Canadian Force	Portuguese Army.	Total.
Hospital (large)	171*	5	4	1	—	—	—	—	—	3	—	2	—	1	—	—	—	187
Hospital (small)	25*	—	—	—	—	—	—	—	1‖	—	—	—	—	—	—	—	—	26
Field Service (complete with generating sets)	—	97	6	6	30	10§	1	2	—	14	6	7	1	—	3	3	1	187
Casualty Clearing Stations (complete with generating sets)	—	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20
Mobile on 3-ton Chassis ..	—	8†	—	—	4	—	—	—	—	—	2	—	—	—	—	—	—	14
Hospital Ships	—	—	—	—	—	34	—	—	—	—	—	—	—	—	—	—	—	34
Portable and Trolley	59‡	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	60
Totals	255	130	11	7	34	44	1	2	1	17	8	9	1	1	3	3	1	528

*48 of the large hospital outfits, 10 of the small, and two of the portable outfits were provided by the Territorial Force Associations and Poor Law Institutions, etc., and were subsequently taken over by the War Office.

† Two of these were constructed in France. ‡ Including 17 Special Femur Outfits for Orthopædic Hospitals. § Including Greek Army 1. ‖ Special Outfit.

TABLE XII.

Field Service X-ray Outfit. (1918 *Pattern.*)

Case.	Description of Contents.	Quantity.
A	Generating set complete with tools and spares and cab-tyre flexible cable (25 yds.)	1
	Transport case	1
B, C, D ..	*Electrical Unit.*	
	(I.)	
	Coil, induction, 12 in. to work from 100 or 200 volts, complete with condenser in case	1
	Milliamperemeter, 0-5, 0-25..	1
	Support for milliamperemeter	2
	Support and holder for valve-tube	2
	Discharging pillars and point .. .. set	1
	Rod, ebonite, to receive H.T. cable from rectifier..	1
	Condenser, spare	1
	Schedule of X-ray outfit .. .. .. copy	1
	Instructions for use of X-ray outfit.. .. copy	1
	Instructions for use of electrical unit .. copy	1
	(II.)	
	Interrupter, mercury-jet type with	1
	Mechanical rectifier to fit interrupter	1
	Mercury for interrupter, 4 lb., in jar	1
	Spare parts for interrupter, viz. :—	
	Copper contacts with screws .. .. set	1
	Coupling springs	2
	Nozzles for jets	2
	Carbon brushes, holders, springs and caps sets	2
	Nuts, lamping	6
	Rubber ring for joint	1
	Lubricators	2
	Spring-tapes (to connect coil and rectifier).. ..	2
	(III.)	
	Table switchboard, complete..	1
	Cable, with plugs to connect switchboard to interrupter .. .. sets	2
	Cable, with plugs to connect coil to interrupter sets	2
	Main plugs	2
	Foot switch, with 4 yds. of cable and plug fitted ..	1
	Spare plug for foot switch cable	1
	Spare set of resistance coil (5) .. .. set	1
	Fuse-holders, spare for table switchboard	2
	Switch springs, spare for table switchboard ..	2
	Transport cases	3
	Upper part of case C is lined with lead to serve for storing sensitive plates.	

TABLE XII—*cont.*

Case.	Description of Contents.	Quantity.
E	Table X-ray base with folding ends	1
	Rods, side iron, and screws, for table-frame ..	2
	Top of three-ply wood for table	1
	Base, T-shaped, heavy metal, for tube stand ..	1
	Pillar, metal, vertical, with brackets, for tube-stand, with counter-weight and cable	1
	Tube-box, complete, with diaphragm, etc., on square metal stem	1
	Tube carrier, wooden pieces .. .. 3 / Spreader, vulcanite on fibre block .. 1 — attached to tube-box.	
	Compressor, cylinder	1
	Tray, metal, screen-carrier, on square metal stem..	1
	Gear-case, metal flat, with wheels and chain ..	1
	Board, three-ply, in frame with metal fittings — For vertical screening	1
	Distance pieces, metal, with end clamps	2
	Screen, fluorescent, in frame, with scales and indicators for localization..	1
	Aprons, protective, with supports	2
	Scale, wooden, for side of table	1
	Pointer, metal, for vertical pillar	1
	Rods, ebonite, with terminals	2
	Springs, coiled	2
	Tapes, metal, spring	2
	Rule measuring, boxwood	1
	Skin-marker, metal	1
	Ink for skin-marker .. .. bottle	1
	Key, box, metal, to fit table-frame	1
	Spare Parts.	
	Cables, wire, flexible, for counter-weights	2
	Wheels, cog (2 sizes)	3
	Bolts for table (2 sizes)	4
	Terminal heads (3 sizes)	6
	Oil-can	1
	Instructions for use of table .. .. .. copy	1
	Transport case..	1
F	Fluorescope, collapsible, for 12 in. by 9 in. fluorescent screen	1
	Handles, protective, detachable, for 12 in. by 9 in. screen	2
	Intensifying screen, in case, 12 in. by 10 in... ..	1
	Cassette for intensifying screen	1
	Desks, viewing with adaptors, complete with plug, flexible wire and lamp-holder	2
	Wire, gutta-percha covered .. .. .. yds.	20
	Wire, fuse, ¼ lb. reels, 10 amp. .. .. No.	2
	Air-cushion, Japanese, rectangular	2
	Rheophores, spring, with metal tape, 6 ft... ..	2
	Mercury .. .. lbs.	10
	Special jar for .. .. No.	1
	Gloves, X-ray, protective .. .. .. pairs	2
	Covers for gloves (to protect palms when required),,	2

TABLE XII—*cont.*

Case.	Description of Contents.	Quantity.
	Aprons, protective	2
	Lamps, electric, 16 c.p., 200 volts, blued.. ..	6
	Lamps, electric, 32 c.p., 200 volts, not blued (for stereoscope)...	6
	Paper, litmus, book	1
	Slide Rule, localizing, complete in case	1
	Letters, metal .. .. sets 1 } in metal box Numbers, metal .. ,, 3 }	1
	Arrows, metal .. .. doz. 3 in metal box	1
	Plate changer, aluminium	1
	Cross wire frame for plate changer	1
	Bags, gas, double	2
	Net for gas-bag	1
	Hydrometer, Hick's	1
	*Voltmeter, pocket, in case	1
	Tool box, containing :—	
	Hammer, 1 lb... 1 — Tins, oil.. .. 2	
	Pliers, cutting .. 1 — Soldering bit .. 1	
	Screwdriver 10 in. 1 — Solder, lbs. .. ½	
	Screwdriver, 6 in. 1 — Blow-lamp, petrol 1	
	Spanner, adjustable 1 — Fluxite, tin .. 1	
	Chisel, cold .. 1 — Wire, copper, lbs. 2	
	Oil-can, lubricating 1	
	Oil, lubricating, in tin, pint. 1	
	Transport case	1
G	Stereoscope, Wheatstone, open type complete ..	1
	Crossbar, iron, with wheels, to fit on bottom of transport case	2
	Transport case	1
H	X-ray tubes, Tungsten target	6
	Transport case	1
J1, J2 & J3	Fabric, black .. .. yds.	4
	Fabric, ruby .. .. ,,	2
	Frames, printing, 12 in. by 10 in.	1
	Lamps, darkroom, combination oil or electric light	1
	Glass, ruby, 10 in. by 8 in., for darkroom lamp ..	2
	Screens, safe-light, 10 in. by 8in., for darkroom lamp	2
	Lifters, plate steel, with wooden handles.. ..	2
	Measures, graduated, 40 oz.	1
	Measures, graduated, 20 oz.	1
	Measures, graduated, 10 oz.	1
	Racks, drying, for 24 plates	1
	Racks, lead-covered, for 6 plates	4
	Rods, stirring-ebonite..	3
	Tanks, fixing, wooden, to hold three 6-plate racks..	1
	Tanks, washing, wooden, with overflow, to hold four 6-plate racks	1
	Trays, enamelled, iron, 20 in. by 16 in.	1
	Trays, enamelled, iron, 12 in. by 10 in.	2
	Trays, wood, rubber-lined, 25 in. by 18 in... ..	1

TABLE XII—*cont.*

Case.	Description of Contents.	Quantity.
	Trays, wood, rubber-lined, 18 in. by 13 in.	1
	Plates, X-ray, double-wrapped, 6½ in. by 4¼ in. doz.	6
	Plates, X-ray, double-wrapped, 8½ in. by 6½ in. doz.	12
	Plates, X-ray, double-wrapped, 10 in. by 8 in. doz.	12
	Plates, X-ray, double-wrapped, 12 in. by 10 in. doz.	12
	Paper, printing, bromide, 12 in. by 10 in., pkts. of 12	6
	Paper, printing, bromide, 8½ in. by 6½ in., pkts. of 12	6
	Paper printing, self-toning, 12 in. by 10 in., pkts. of 12	6
	Paper printing, self-toning, 8½ in. by 6½ in., pkts. of 12	6
	Transport cases	3
K	Developer, metol-hydroquinone, in tins, each containing sufficient powder to make 80 oz. of solution .. .. tins	12
	Chemicals, fixing, in tins, each containing sufficient powder to make 60 oz. of fixing bath .. tins	12
	*Acid, sulphuric, in 1 lb. bottles (for accumulators) lbs.	4
	Bottles, Winchester, quarts	4
	Transport case	1
	Crate cylinders, coal-gas, 20 cubic feet with coir covers	2
L	Key, lever for	1
	Valve, fine adjustment, for	1
*M ..	Accumulators, 6-volt, celluloid cells, in hardwood case	3
	Transport case	1
*N ..	Accumulators, 6-volt, celluloid cells, in hardwood case	5
	Transport case	1
*O ..	Coil, induction, 12 in., to work from 36 volts (accumulators) and Interrupter, mercury jet .. (combined in case)	1
	Milliamperemeter	1
	Milliamperemeter support	1
	Discharging pillars and points .. .. set	1
	Cable, cab-tyre, flexible, 2 yds, attached to plug to fit interrupter	1
	Transport case	1

Items marked * are supplied only where accumulators are to be in use and included in the outfit.

TABLE XIII.

Dental Outfits issued, 4th August, 1914, to 3rd August, 1919.

	Home Outfits.	Field Outfits.	Mechanical Outfits.	Camp Outfits.	Anæsthetic Outfits.	Specially designed Outfits for		Totals.
						Dental Surgeons	Mechanics	
Home Stations ..	516	22	48	62	196	1	10	855
France	2	119	70	—	116	2	—	309
Egypt	4	44	36	—	46	—	—	130
Mediterranean ..	—	6	2	—	6	—	—	14
Salonika	—	32	32	—	31	—	—	95
Malta	9	3	5	—	12	—	—	29
Gibraltar	1	—	1	—	1	—	—	3
Italy	—	4	4	—	3	—	—	11
Holland (P. of W.)..	2	1	—	—	—	—	—	3
North Russia ..	—	6	—	—	5	—	—	11
Mesopotamia ..	1	20	10	—	21	—	—	52
India	12	39	74	—	40	—	—	165
East Africa ..	—	3	2	—	3	—	—	8
South Africa ..	—	1	1	—	1	—	—	3
Hospital Ships ..	3	—	1	2	3	—	—	9
Casualty Clearing Stations	—	29	—	—	5	—	—	34
Royal Air Force ..	46	4	14	12	52	—	—	128
United States units	—	4	—	—	4	—	—	8
Totals	596	337	300	76	545	3	10	1,867

These outfits were packed in 3,779 cases, the total measurement of which was 890 tons.

TABLE XIV.

Field Dental Outfit (Revised September, 1917).

10 oz. Porros "Invincible" Alloy.
1 lb. Mercury.
Two packets temporary Gutta-percha.
One box Gutta-percha Points.
Two boxes Oxyphosphate of Zinc Cement, pale yellow and pale grey.
One packet Oxyphosphate of Copper Cement.
One No. 5 Large Record Sterilizer with spirit lamp (8½ in. by 4½ in. by 2 in.).
Five pairs Forceps.
One pair Elevators with metal handles.
One Read's Elevators with metal handles.
One Dally Lancet.
One pair Scissors.
One Side Wheel Cable Engine, with slip joint and lathe attachments, complete in box.
One pair Engine Pliers.
Two extra Driving Cords, for above engine.
Three Wrist Springs for engine.
One Contra Angle Attachment for slip joint.
One gross Burrs.
Half doz. Boutelrock's Drills.
Two Huey's Mandrels.
One doz. selected Impression Trays.
6 lb. Stent's Composition.
One Screw Mandrel.
One Moore's Mandrel.
Six boxes Moore's Discs.
One doz. Mtd. Carborundums for engine.
1 oz. Powdered Shellac, in tin box.
One box Darby's Buff polishers.

TABLE XIV—*cont.*

1 lb. Superfine Pumice Powder.
Three boxes Bristle Brushes.
One Wire Brush for cleaning burrs.
One small Screw Driver with revolving head and four points.
One bottle Oil for engine, 2 oz.
Three Howe's Scalers.
Two enamelled Chisels.
Five double-ended Excavators.
Five Probes.
Six packets Excelsior Pulp Canal Cleansers.
Two packets Donaldson's Pulp Canal Cleansers, in vulcanite handles.
One Pulp Canal Plugger.
Two Nerve Inst. Holders.
One Hampel's Amalgam Carrier, all metal.
Six Plastic Filling Insts.
Two Steel Spatulas.
Six Plastic Filling Insts.
One box Celluloid Strips, clear.
Two pair College Tweezers.
One Mitchell Trimmer, with metal handle.
Half doz. Flexo Files, assorted.
Two boxes Perfection Polishing Strips, assorted.
One pair Stokes Clamp Forceps.
Two American Pattern Clamps.
Two Mouth Mirrors, with smooth handles, plane glass.
Four extra Mirror Tops.
One Chip Syringe.
One Hunt's Syringe.
One Lennox Matrix Outfit, without case.
One bundle Orange Wood Sticks.
Two Files.
One 1½ in. by ¼ in. square Carbo Wheel for engine lathe attachment.
One Sculptor and Handle.
One Arkansas Slab, in box.
One pair Pin Pliers.
One pot Pulp Devitalizing Fibre.
One 1-oz. bottle Calvert's Carbolic Acid.
One bottle Carbolized Resin.
Two packets Oxpara.
One Caustic Point in wood case.
Two boxes 500 Wool Rolls, assorted.
Two boxes 500 Napkins.
1 lb. Cotton wool, absorbent.
One Cotton wool Holder.
Two Reels Wxd. Floss Silk.
One bottle Thick Mastic Cement.
One Boxwood Mercury Bottle.
One Metal Spirit Lamp.
Two 16-oz. bottles Lysol.
Three Tumblers, aluminium, ½-pint size.
One Glass Mixing Slab.
One Glass Pestle and Mortar.
Three Books Artic Paper, thin.
One 2-quart tin Methylated Spirit, the tin to have screw cap.
One 4-oz. pot Vaseline.
Two Enamelled Steel Spittoons, squat pattern.
One 2-oz. bottle Absolute Alcohol.
1 oz. Tannic Acid.
Three Dappens Glasses, assorted colours.
Two Imperial Syringes, Crutch Handles, with accessories and mounts.
Twelve Tubes Hypodermic Needles for Imperial Syringe.
Three doz. Washers, saturated in grease, for Imperial Syringe.

TABLE XIV—*cont.*

Twenty-four Tubes Novocain Tablets "E."
One 2-oz. bottle Oil of Cloves.
One 2-oz. bottle Eucalyptol.
One 3-oz. bottle Aconite and Iodine.
Two 2-oz. bottles Hydrogen Peroxide.
One Wood Box with divisions for above drug bottles.
One Army Pattern Folding Chair, with special headrest in case.
One hospital pattern Cabinet Table in walnut, top covered with linoleum, angles of drawers rounded inside, one drawer fitted with burr holder.
One Floor Stand, fitted with spittoon and tumbler holder, to support cabinet table.
Eight glass-stoppered Drug Bottles for Cabinet.
One Transport Case for Chair.
One Transport Case for other goods.

TABLE XV.

Dental Anæsthetic Outfit. (*Revised September*, 1917.)

One Twin Nitrous Oxide Gas Stand with Union and two Foot Keys, but without upright. With two 100-gallon Angle Bottles, filled with gas, 3 gallon Silk Gas Bag, Tubing with Mounts, 3-way Wellers Stopcock, large Celluloid Face-piece, and one spare medium Face-piece, hard rubber, also Hook and Chain to attach apparatus to chair.
Six extra 100-gallon Angle Bottles, filled with gas.
One Gas Apron.
One set three Hewitt's Mouth Props fitted with lead pads and silver connecting chain.
One doz. extra Lead Pads for above.
One Fergusson's Gag.
One Aseptic Tongue Forceps.
One Aseptic Sponge Holder.
Two boxes Absorbent Cotton Swabs.
One quart tin Methylated Spirit.
One Transport Case to contain the above with divisions for gas bottles, twin stand, union, two foot keys, and tin of methylated spirit.

TABLE XVI.

Dental Mechanical Outfit. (*Revised September*, 1917.)

Electric Lathe, if possible, or Foot Lathe with No. 4 Lathe Head and Plain Oak Top.
One length of Gut for above with hook and eye.
One Zinc Polishing Trough.
One Water Trough, Zinc.
Half doz. assorted Carborundum Wheels, square edge.
Two doz. assorted Lathe Brushes.
Two Rubber Plaster Bowls (large size).
One Plaster Mixer.
One Plaster Knife.
2 cwts. Fine Plaster of Paris.
14 lb. Modelling Wax.
Two Wax Knives, Fig. 1.
Four Articulators.
7 lb. Base Rubber.
3 lb. Pink Rubber.
Two Rubber Packers.
Eight Gun-metal Flasks, four large and four small, with Clamps and Wedges.
One Portable Vulcanizer, with Thermometer and Paraffin Stove (to hold three Flasks—two large and one small—with clamps and wedges). Where gas is available vulcanizer to be fitted with gas burner, 3 ft. India-rubber Tubing and Regulating Gauge.

TABLE XVI—*cont.*

Half doz. half round Files, with handles—two rough, two bastard, and two smooth.
One File Cleaner.
Six rolls Glass Paper.
Two pairs Drake's Medium Vulcanite Scrapers.
Four Sculptors with Handles.
One Arkansas Sharpening Stone, in case.
One Draw Plate, 30 round holes.
Two Pliers, pin roughing and bending.
Two Pointed Pliers.
Two Collar Pliers, polished.
Two pair Cutting Nippers.
One Riveting Hammer, medium.
One Light Anvil, on block.
One Parallel Vice, 3½-in. jaws.
One Piercing Saw Frame, with one gross of Blades (assorted).
½-lb. box Model Cement.
Four Solder Tweezers.
Two Metal Spirit Lamps (where gas is not available), with one bundle of wick.
Two Bunsen Burners, without rose, if gas is available.
One Solder Block, Asbestos.
One Primus Stove, with stand.
One No. 15 Standard Gas Burner and 3 ft. India-rubber Tubing (where gas is available.)
One Tin Kettle, copper bottom, 3-pint size.
½ lb. Pattern Lead.
28 lb. fine Pumice in tin box.
One 7-lb. tin Whiting.
One small Hammer, with ½ lb. head.
Two Mouth Blowpipes, without moisture chamber.
One Fletcher's Blowpipe with Bellows, Tubing, complete.
1-lb. tin French Chalk.
One Oil can and bottle of Oil.
One pair Rubber Scissors.
Half doz. Cloths.
One pair Flask Lifting Tongs, Sutton's.
One bottle Sulphuric Acid.
Two rounded Felt Cones, one large and one small.
One Acid Pan, Doulton Ware.
½ lb. Borax.
One Borax Tray.
Victoria Metal Plate, about 2 oz.
Victoria Metal Wire, about 2 oz.
1 lb. German Silver Wire.
Two Reels Ligature Wire.
1 oz. Silver Solder.
One pair Stubbs' Shears, 7 in. curved, cut right.
1 oz. Gunthorpe Wire, very thin.
One Hot-water Plate, for heating rubber (with copper bottom).
Half doz. Bench Pins.
Two Clamps for above, to fit ordinary table.
One Japanned Case, with trays to hold about 3,500 teeth.
3,000 Diatoric Teeth.
500 Pin Teeth.
3 oz. 16-ct. Gold Wire.
½ oz. No. 3 Gold Solder.
One Packing Crate for Lathe.
One Packing Case for Metals, Plaster Sundries, etc.
One Packing Case for other Goods.

TABLE XVII.

Special Splints and Crutches purchased between 4th August, 1914, and 3rd August, 1919.

Crutches, Wantage, pairs	28,971
Frames, abduction	2,112
Splints :—	
Arm, angular, lateral, flat	159,436
Back leg, wood, with footpiece	147,583
Back leg and thigh, Morris', with extension screw	20,180
Clarke's arm	45,277
Clarke's thigh, interrupted	10,000
Forearm, iron	900
Jones' dorsiflexed hand	14,266
Jones' elbow	14,014
Jones' guttershape	27,600
Jones' modified Thomas' humerus extension	22,989
Jones' modified Thomas' knee for arm extension	106,651
Jones' ditto extension grips for	4,000
Jones' skeleton leg	8,860
Jones' wrist	12,752
Modified Depage's humerus	25,250
Salmon's humerus	5,300
Thomas' knee	129,792
Thomas' knee, sliding frame footpieces for	52,950
Thomas' knee, hide anklets and simple metal extension for	19,808
Tubby's malleable iron	5,760
Wallace-Maybury	5,642
Total	839,010

Note.—Including these special Splints, the total number of splints issued from 4/8/1914 to 3/8/1919 was 1,674,734.

TABLE XVIII.

Mechano-therapy Equipment for Military Orthopædic Hospitals.

Description of articles.	100 Beds (Officers).	2,000 Beds.	3,000 Beds.
Rib Stalls	2 sets	15 sets	25 sets
Horizontal beams—measurements 15 ft. by 7 in. by 2½ in.—adjustable heights if possible—with two coco-nut mats to each, each 6 ft. by 4 ft.	1		6
Fixed Horizontal Bars, approximately 7 ft. 6 in. from the ground, and 6½ in. in circumference	1	1	2
Parallel Bars, with 4 mats to each set, each 6 ft. by 4 ft.	—	2 sets	3 sets
Gymnastic Rings suspended from the ceiling and adjustable in height ..	2 sets	4 sets	8 sets
Medicine Balls, 5 lb. each	—	4	5
Medicine Balls, 8 to 10 lb. each	2	4	5
Wooden Dumb-bells (8 oz. each dumb-bell)	3 pairs	18 pairs	25 pairs
Indian Clubs (8 oz. each club)	3 pairs	—	—
Nautical Wheels, adjustable centre 4 ft. 4 in. from the ground	1	2	3
Wrist Rolls, with three or more grips of different sizes, with handle at both ends for pronation and supination. There should be a fourth grip of very much smaller dimensions, approximately 3 in. circumference	1	4	6
Forms with adjustable leather clips for attaching to rib stall—measurements 12 ft. by 10 in. by 13 in. high	1	6	6
Ropes for jumping, with sand-weighted ends, length 24 in.	1	2	2
Basket-or Net-ball set, comprising two goal-posts, nets, and two balls ..	1	1	1
Orthopædic mats for re-education in walking, if possible the whole length of the gymnasium, with three black lines each 2 in. wide and 6 in. apart—measurement between outside lines 18 in.	1	1	2*
Ladders, each 18 ft. long, 16 in. wide, with rungs 11½ in. apart and 4 in. in circumference	1	2	2
Dimensions of Gymnasium	50 ft. by 30 ft. by 40 ft. in height.	60 ft. to 70 ft. by 35 ft. to 40 ft. by 40 ft. in. height.	100 ft. by 50 ft. by 40 ft. in height.

* One either side of the gymnasium.

TABLE XIX.

Minimum Anæsthetic Outfit for an Operating Theatre in a Military Hospital.

Bottles, drop (4 oz.)		3
Forceps, tongue (Guy's)		1
Forceps or holders, sponge		2
Gags, mouth (Mason's and Doyen's)		2
Inhaler, ether, Clover's large bore, with two face-pieces (large and small), with nitrous oxide apparatus combined	set	1
Inhaler, chloroform, Junker's (Buxton's)		1
Masks, Schimmelbusch's		2
Oxygen cylinder and fittings	set	1
Props, mouth		3

TABLE XX.

Cholera Unit.

A.—Issued from Army Medical Stores, Woolwich—		
Cholera Outfit (This contains sufficient drugs, instruments, apparatus and dressings to treat 100 patients on the lines laid down by Sir Leonard Rogers.)		1
Water-testing (Cholera) Outfit (Issued with five dozen refills of culture medium. Two such outfits are, as a rule, issued with three Cholera outfits.)		1
Batiste Overalls		6
Rubber Gloves	pairs	6
Calcium Permanganate (50 per cent.) solution	lbs.	4
Cholera Notes. (These are instructions drawn up from Rogers' book, "Cholera")	copies	3
Rogers' Reprints. (Reprints of later publication by Rogers)	copies	3
Case-taking Sheets (Special for Cholera)		100
Measure glasses (20 oz.)		2
Glycerine, pure	lb.	1
Hydrometers (Turner's)		2
Pills of Potassium Permanganate (enteric-coated)		10,000
B.—To be issued from local stores—		
Tins, Vaseline. (5 lb. each)		2
5-gallon drums Cresol		2
5-gallon drums Spirit. Vin. Methylat.		2
Matches	boxes	12
Barley	lbs.	56

TABLE XXI.

Principal Vaccines supplied to the undermentioned destinations between 4th August, 1914, and 3rd August, 1919 (inclusive).

Vaccines.	Home.	Hospital Ships and Transports.	France.	Malta.	Mudros.	Salonika	Italy.	Russia.	Egypt.	Basra.	India.	Africa.			Other Stations abroad.	Totals.
												East.	West.	South.		
	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.
Typhoid	5,079,787	41,850	871,560	25,500	145,000	—	—	—	103,350	—	65,679	144	—	120	—	6,332,990
Paratyphoid	—	1,100	1,840	5,000	5,000	4,250	—	—	12,000	—	1,500	—	—	—	—	30,690
Mixed Typhoid and Paratyphoid	5,201,832	71,280	7,002,800	60,525	—	772,350	416,300	599,900	3,306,600	11,000	47,500	7,830	14,900	37,350	15,400	17,565,567
Typhoid for treatment	—	—	9,700	—	1,800	12	—	—	500	—	—	34	—	—	—	12,046
Typhoid for Indians ..	—	—	82,470	—	—	—	—	—	—	—	—	—	—	—	—	82,470
Mixed T.A.B. for Indians	—	—	116,960	—	—	—	—	—	—	—	—	—	—	—	—	116,960
Cholera	179,456	724,675	1,045,495	40,100	334,998	440,100	150,500	591,000	3,675,450	—	—	250	—	—	—	7,182,024
Cholera for Indians ..	—	—	—	—	—	—	—	—	80,000	—	—	—	—	—	—	80,000
Sepsis	11,344	7,100	151,425	165	8,500	7,150	3,800	4,500	40,400	800	800	—	—	—	—	235,984
Gangrene	1,000	—	79,975	—	—	—	—	—	1,725	—	—	—	—	—	—	82,700
Staphylococcus ..	50,377	947	171,115	4,655	—	5,100	9,100	4,700	43,250	880	1,200	150	260	—	—	291,734
Staphylococcus and Acne	11,133	—	20,687	20	—	3,500	1,150	—	2,650	—	—	—	—	—	—	39,140
Pneumococcus ..	12,413	50	13,170	220	6,500	2,400	—	—	1,650	—	—	—	—	—	—	36,403
Ditto for Kaffirs ..	—	—	64,400	—	—	—	—	—	—	—	—	—	—	—	—	64,400
Streptococcus	22,147	292	31,223	1,210	2,200	2,800	3,300	2,850	42,400	880	1,200	—	144	—	—	110,646
Ditto, Sensitized ..	766	—	200	315	—	—	150	—	500	—	—	—	—	—	—	1,931
Gonococcus	15,395	174	48,525	1,740	—	—	2,505	—	—	—	—	—	320	—	—	68,659
B. Coli	8,328	—	1,850	1,200	—	3,350	—	1,000	6,400	800	1,200	—	—	—	—	24,128
Plague	—	—	129,760	1,350	—	6,000	250	101,100	49,300	—	—	—	—	—	450	288,210
Plague, Haffkine's ..	—	—	—	1,100	—	—	—	—	4,380	—	—	—	—	—	—	5,480
Meningococcus ..	515	—	—	250	—	375	—	—	1,550	100	150	—	96	—	—	3,036
Mixed for Colds ..	3,509	—	10,968	—	—	480	100	—	200	—	—	—	—	—	—	15,257
Influenza	800,850	48,000	172,000	—	—	5,000	1,000	93,500	62,500	—	—	—	—	—	9,300	1,192,150
Dysentery Sero-vaccine	—	—	35,000	280	—	6,000	—	7,500	175,000	7,500	—	15,500	—	—	—	246,780
Emulsions (Bacterial)..	—	200	14,480	760	—	750	—	—	240	350	—	—	—	—	—	16,780
															Total c.c.	34,126,165

TABLE XXII.

Principal Sera supplied to the undermentioned destinations between 4th August, 1914, and 3rd August, 1919 (inclusive).

Sera.	Dose.	Home.	Hosp. Ships and Transports.	France.	Malta.	Egypt.	Mudros.	Salonika	Basra.	India.	Africa.			Italy.	Russia.	Other Stations.	Total.
											East.	West.	South				
Anti-tetanic ..	Units. 500	1,712,846	33,142	6,837,915	89,275	953,500	223,000	579,000	273,470	18,000	14,980	114	—	128,120	236,030	164	11,099,556
Anti-tetanic (High Potency)	8,000	12,923	—	5,922	—	2,000	—	550	500	—	72	—	—	662	—	—	22,629
Anti-tetanic gas gangrene	—	590	—	75,000	—	—	—	—	—	—	—	—	—	—	—	—	75,590
Anti-diphtheritic ..	2,000 c.c.	30,850	8,448	54,998	5,600	68,400	8,000	5,700	13,930	600	732	184	—	1,600	11,012	45	210,099
Anti-meningococcic	15	23,566	1,298	25,604	906	12,144	14,001	6,614	11,244	333	2,444	248	—	335	2,542	60	101,339
Anti-dysenteric ..	20	19,677	4,190	14,668	4,650	149,360	9,200	64,490	34,550	600	3,694	—	100	14,300	17,650	—	337,129
Anti-streptococcic .	10	16,518	445	13,226	2,200	1,150	500	1,840	1,180	—	1,160	24	—	265	3,070	20	41,598
Anti-anthrax ..	10	254	—	439	30	182	—	135	225	—	36	—	—	—	—	—	1,301
Anti-plague ..	20	3,057	—	—	2,750	127	—	50	—	—	—	—	—	—	—	—	5,984
Anti-venom ..	25	—	—	50	—	700	—	660	—	—	160	50	—	—	—	—	1,620
Normal Horse ..	10	4,408	—	3,225	84	—	—	—	—	—	—	—	—	—	—	—	7,717
Standard Sera, etc.	1	2,066	10	47,750	380	1,950	—	1,043	1,125	—	—	—	—	20	50	—	54,394
Agglutinating ..	1	8,231	243	25,085	1,414	5,842	144	3,196	1,318	—	332	60	—	866	2,000	—	48,731
Tuberculins ..	1	390	—	170	6	—	—	—	30	—	—	—	3,600	2,200	4,444	—	10,840
Wassermannreagents	1	1,570	—	670	—	—	—	24	—	—	20	—	—	—	12	—	1,296
Other Sera, various	—	640	—	2,734	13	550	—	114	—	—	210	—	—	382	400	30	5,073
																Total	12,024,896

TABLE XXIII.

Statement of some New Apparatus and Methods of Treatment adopted during the War.

1. An immense variety of splints and fracture apparatus, in which metal has largely replaced wood.
2. A large variety of surgical instruments and appliances.
3. Anæsthetic apparatus.
4. Universal stand for gas cylinders.
5. A new pattern hypodermic syringe.
6. Haldane's oxygen inhalation apparatus.
7. Crutches with adjustable handles.
8. Wound irrigators, including Carrel's apparatus.
9. Wound applications such as Dakin's solution, Eusol, Chloramine, Dichloramine, hypochlorite solution obtained by electrolysis of sea-water, hypertonic salt solution, peroxide of hydrogen, acriflavine, proflavine, brilliant green, nikalgin, No. 7 paraffin (for burns), B.I.P. paste, dielectric oil.
10. Specially prepared sterilized dressings cut up for rapid use in casualty clearing stations. Sterilized dressings for use on board transports.
11. Sphagnum moss which was largely used as a substitute for cotton-wool—it was put up in muslin bags, loose or compressed, and was impregnated with Perchloride of Mercury.
12. A new pattern first field dressing containing an iodine ampoule (since discarded) and khaki bandage instead of white.
13. Shell dressings, a first-aid dressing for shell wounds, about three times the size of a first field dressing, and also having a khaki bandage and a large ampoule of iodine (now discarded).
14. A first-aid outfit for aeroplanes.
15. A first-aid outfit for tanks.
16. A new pattern field operating table.
17. A new pattern field fracture box in which malleable steel has been substituted for aluminium.
18. New pattern containers for various articles in the field medical equipment.
19. New pattern enamelled iron water-bottle.
20. Camp medicine boxes containing drugs, dressings and appliances suitable for camp use at home.
21. A chemical case for the detection of metallic poisons in water.
22. A chemical case for chlorine estimation in connection with the sterilization of water.
23. Mobile Laboratories, bacteriological, hygiene, X-ray, and dental.
24. Mobile Operating Theatre.
25. New Scale of equipment for River Hospital Steamers and Barges.
26. A complete cholera outfit, with water-testing case.
27. Dental Surgeons' outfits for home and field service use and Dental Mechanics' outfits.
28. New designs of X-ray apparatus and equipment.
29. Improved protection for X-ray operators.
30. Giant magnets for assisting in the extraction of pieces of steel, etc., from the eye.
31. The Army pattern spectacles.
32. A new pattern sun-goggle was designed with metal cups containing chlorophyl smoked eyepieces of non-inflammable celluloid.
33. A new pattern ophthalmic lamp.
34. New optical apparatus for detection of malingerers.
35. The extended use of electro-medical and mechano-therapeutic methods of treatment.
36. An electric telephone probe.
37. Galvanometric diagnosis of disease.
38. Various therapeutic remedies such as Kharsivan, Arseno-benzol, Galyl, Double Iodide of Emetine and Bismuth, Absorption Ipecacuanha.

TABLE XXIII—*cont.*

39. Rogers' intravenous treatment of malaria by means of antimony.
40. Ammonia ampoules for use in cases of " gassing."
41. The substitution of British-made drugs and bacteriological stains, sugars, reagents and glass-ware for those formerly obtained from enemy countries. Substitutes for Carbolic Acid.
42. Use of Multiple Vaccines, e.g., T.A.B. Vaccine.
43. Various types of stretchers adapted for trench warfare, also a large variety of wheeled stretcher carriers.
44. A variety of bed-tables.
45. An apparatus for the transfusion of citrated blood.
46. Intravenous injection of solution of Gum Arabic.
47. Plaster Pylons (provisional artificial limbs).

TABLE XXIV.

List of Army Council Instructions regarding Economy and Prevention of Waste in the use of Medical and Surgical Supplies and Equipment.

1916.

1. Indenting for medical and surgical stores (A.C.I. 93).
2. Estimation of requirements of Glycerinated Calf Lymph (A.C.I. 139).
3. Indenting for Sera and Vaccines (A.C.I. 201).
4. Economy in use of medical and surgical stores (A.C.I. 218).
5. The preservation of Pathological Specimens (A.C.I. 355).
6. Articles in use in Army Hospitals which can be obtained from the Director-General of Voluntary Organizations (A.C.I. 408).
7. Accounting for medical stores in Army Hospitals (A.C.I. 629).
8. Accounting for medical stores issued to units at home other than Army Hospitals (A.C.I. 647).
9. Developer for X-ray plates and papers (A.C.I. 948).
10. Addressing of medical stores and returned empties (A.C.I. 1380).
11. Disposal of unserviceable medical stores in Commands (A.C.I. 1384).
12. Local purchase of medical stores (A.C.I. 1402).
13. Accidental breakages of medical and surgical stores made of glass and earthenware (A.C.I. 1525).
14. Transmission of discarded splints to Army Medical Stores (A.C.I. 1583).
15. Supply of standard cultures and sera for diagnostic purposes (A.C.I. 1730).
16. Economy in use of clinical thermometers in Army Hospitals (A.C.I. 1790).
17. Supply of compressed drugs to Army Hospitals at home (A.C.I. 2042).
18. Supply of Tetanus Antitoxin and Syringes to Hospitals at home (A.C.I. 2436).

1917.

19. Return of empty clinical thermometer cases to Army Stores (A.C.I. 8).
20. Disposal of scrap precious metal from dentures (A.C.I. 83).
21. Supply of artificial limbs, eyes, and surgical appliances to invalided soldiers (A.C.I. 144).
22. Supply of Glycerine (A.C.I. 227).
23. Supply of Spectacles (A.C.I. 690).
24. Surgical Instruments—return of surplus stocks from military hospitals (A.C.I. 778).
25. Care and disposal of empties (Medical Stores) (A.C.I. 1201).
26. Provision of Spectacles for soldiers invalided on account of defective vision (A.C.I. 1239).
27. Supply and repair of Surgical Appliances for disabled soldiers (A.C.I. 1275).
28. Indents for Bacteriological Stores (A.C.I. 1298).

TABLE XXIV—*cont.*

29. Issue of Spectacles to Pilots and Observers of the Royal Flying Corps (A.C.I. 1383).
30. Custody of and accounting for Field Medical Equipment issued to Regimental units (A.C.I. 1780).
31. Disposal of Ambulance Stretcher " Suspension Bars " (A.C.I. 1773).
32. Supply of Olive Oil (A.C.I. 1774).
33. Indenting for Medical Stores (A.C.I. 1803).
34. Issue of Spectacles to Officer Cadets (A.C.I. 1827).

1918.

35. Supply and repair of surgical boots for serving soldiers (A.C.I. 51).
36. Provision of dental appliances to Officers under Article 647 of the Pay Warrant (A.C.I. 284).
37. Supply and repair of surgical appliances (other than artificial limbs) for disabled soldiers (A.C.I. 504).
38. Disposal of used surgical dressings (A.C.I. 585).
39. Functions of County Directors regarding hospitals other than those directly under the Military Authorities (A.C.I. 614).
40. Elastic Springless Trusses (A.C.I. 910).
41. Supply, repair and renewal of artificial limbs for disabled soldiers (A.C.I. 939).
42. Articles for use in Army Hospitals which can be obtained from the Director-General of Voluntary Organizations (A.C.I. 940).
43. Provision of artificial eyes and spectacles for soldiers who have been or are about to be invalided (A.C.I. 999).
44. Supply of artificial limbs for Officers (A.C.I. 1148).
45. Supply of spectacles to Officers (A.C.I. 1259).
46. Provision of artificial eyes and spectacles for naval pensioners who have been invalided (A.C.I. 1347).
47. Supply of spectacles to soldiers (A.C.I. 1349).

1919.

48. Supply of Glycerine (A.C.I. 15).
49. Taking and despatching of specimens for examination by the Wassermann Test. Reports on specimens examined, etc. (A.C.I. 34).
50. Issue and custody of poisons (A.C.I. 51).
51. Amendment to A.C.I. 34/1919 (A.C.I. 63).
52. Disposal of unserviceable medical stores in Commands (A.C.I. 291).
53. War Office X-ray Laboratory—change of designation and address (A.C.I. 409).

APPENDIX F

OPERATIONS IN THE CAMEROONS

Table I.—Medical units with the various columns.
Table II.—Admissions into and out-patients treated at the Duala Base Hospital.
Table III.—Statistics of invaliding and deaths from disease.
Table IV.—Contents of Medical and Surgical boxes with field units.
Table V.—List of Drugs, etc., required for three months.
Table VI.—Field Rations issued to Native troops and carriers on the Second Jaundé Expedition.
Table VII.—Precautions in case of Yellow Fever occurring at Duala.

TABLE I.

British Medical Units despatched with various Columns in the Cameroons.

The arrangements with the French Columns are not included.

Operations.	Date.	Field Medical Units despatched.	Casualties.	Average Daily sick.	Evacuated.
			(The numbers are approximate only.)		
Dibamba Creek .. .. (Capture of Duala)	25/9/14 ..	2 Sections Field Amb. (reduced scale).	11	—	—
1st Jabassi	6–9/10/14 ..	2 Sections Field Amb. (reduced scale).	40	Not recorded	—
2nd Jabassi	11–13/10/14	2 Sections Field Amb. (reduced scale).	3	,,	—
Capture of Edea .. .. (Allied Force)	20/10/14 26/10/14	1 Section Field Amb. (To assist French).	45 (Allied)	,,	About 50 British
1st Phase Northern Rly...	30/10/14 6/11/14	2 Sections Field Amb.	43	150	200
Buea	12/10/14– 15/10/14	2 Sections Field Amb. and 1 Equipment.	10	Not recorded	—
2nd Phase Northern Rly.	3/12/14– 10/12/14	2½ Sections Field Amb. 1 Clearing Section. Railhead. N/samba.	under 20	30	250
Dschang—1st Operations	23/12/14– 10/1/15	2 Sections Field Amb. 1 Clearing Section Railhead.	23	300	456
Operations round Bare ..	3/2/15 ..	2 Sections Field Amb. 1 Clearing Section. Railhead.	118	—	Nearly 100 wounded.
Do.	27/2/15 ..	Do. ..	19	—	14
Do.	4/3/15 ..	Do. ..	—	—	28
Dschang—2nd Operations	12/10/15 30/12/15	1½ Sections Field Amb. 1 Clearing Section. Railhead.	44	100	200–300
Kribi Expedition.. ..	24/1/15– 1/3/15	1 Section Field Amb.	4	150	200–300
Nyong Expedition ..	–/7/15	1 Section Field Amb.	10	30	Not recorded.
1st Jaundé Expedition ..	10/4/15– 4/5/15	1½ Section Field Amb. Clearing Section	32	100	300
1st Jaundé (Allied) ..	25/5/15– 20/6/15	2 Sections Field Amb. 1 Evacuating Section, 1 Clearing Station, Edea. 1 Section Field Amb.	Over 200 (Allied)	300–400	About 1,000
2nd Jaundé Expedition ..	Sept. 1915 1/1/1916	5 Sections Field Amb. 1 Evacuating Section, 1 Clearing Section,	Over 250	400–500	4,000
1st Campo Expedition ..	July–Sept., 1915	2 Sections Field Amb.	35	100–150	About 200
2nd Campo Expedition ..	Dec., 1915– March, 1916	2 Sections Field Amb. (To French L. of C.)	Nil British	200–300	About 500
Final British	Feb. 1st–20th	2 Sections Field Amb.	About 30	200–300	300

TABLE II.

Admissions into the Base Hospital at Duala.

The admissions for the French Troops and Carriers are to the end of January; for the British to the 19th February, 1916.

Diseases.	Europeans.		Native Soldiers		Carriers.		
	British	French	British	French	British	French	Totals
Enteric Fever ..	2	4	—	—	—	—	6
Enteritis	1	2	30	—	60	—	93
Mumps	—	—	32	2	1	—	35
Chicken-pox ..	—	—	19	—	28	—	47
Dysentery	69	31	624	119	881	126	1,850
Beri-beri	—	—	6	296	13	33	348
Malaria	383	230	325	157	1,150	165	2,410
Sleeping Sickness ..	2	—	—	1	—	—	3
Blackwater.. ..	6	4	1	—	—	—	11
Major Septic ..	—	—	2	50	54	—	106
Minor Septic(Tropical ulcer)	74	13	1,512	957	3,372	1,280	7,208
Pneumonia.. ..	5	3	64	28	680	58	838
Rheumatism ..	19	3	453	42	611	10	1,138
Tonsilitis	4	—	1	1	—	—	6
Tubercle of Lungs..	7	1	4	20	6	23	61
Venereal	8	34	228	106	84	21	481
Guinea-worm ..	—	—	46	13	49	21	129
Other parasitic ..	—	2	125	20	286	—	433
Anæmia	104	63	60	39	231	—	497
Other General ..	9	37	326	152	703	170	1,397
Circulatory.. ..	14	2	46	6	391	—	459
Nervous	18	4	47	15	127	1	212
Respiratory ..	49	7	480	201	1,212	—	1,949
Hernia	2	—	41	15	117	—	175
Digestive	97	22	295	143	1,036	95	1,688
Lymphatic	11	—	19	—	—	—	30
Urinary	6	—	31	—	63	—	100
Generative	4	—	34	8	171	—	217
Myalgia	7	—	4	4	41	—	56
Organs of Locomotion	6	—	80	1	—	3	90
Connective Tissue	—	—	8	—	19	—	27
Skin	16	8	94	51	128	16	313
Sunstroke	7	3	1	—	—	1	12
Local Injuries ..	26	9	270	44	615	73	1,037
Injuries in action ..	39	31	419	235	39	29	992
Poisons	6	—	—	1	—	—	7
	1,001	513	5,727	2,727	12,168	2,125	24,261

TABLE II—*cont.*

Analysis of 25,000 *of the British Out-patients treated at the Duala Hospital.*

Dysentery	273	Brought forward	21,689
Malaria	390	Colic	526
Ulcers*	12,928	Stomatitis	425
Rheumatism	2,634	Gastritis	245
Guinea-worm	146	Dental Caries	73
Neuritis	207	Gonorrhœa	382
Conjunctivitis	348	Orchitis	54
Ear affections	94	Scabies	275
Bronchitis	1,854	Myalgia	258
Pleurisy	553	Ringworm	573
Diarrhœa	1,570	Craw-craw	356
Constipation	692	Eczema	144
Carried forward	21,689	Total	25,000

* Approximately two-thirds of these were tropical ulcers, and the remainder ulcers caused by guinea-worms and chiggers, which had been extracted by natives.

TABLE III.

Statistics of Invaliding and Deaths from Disease.

(British to 21/2/16, French to 19/2/16.)

Invalided.

Diseases.	Europeans.		Native Soldiers.		Carriers.	
	British.	French.	British.	French.	British.	French.
Enteric Fever	—	6	—	—	—	—
Chicken-pox	—	—	—	—	15	—
Beri-beri	—	—	4	255	—	56
Blackwater	2	5	—	—	—	—
Malaria	19	128	11	22	68	17
Leprosy	—	—	5	—	—	—
Dysentery	13	34	22	55	749	154
Major Septic	—	—	3	3	—	4
Tropical Ulcers	—	—	80	46	2,500	1,476
Other Minor Septic ..	9	1	41	20	144	43
Pneumonia	—	1	14	35	416	30
Rheumatism	—	2	49	—	324	—
Tubercle of Lungs ..	2	—	16	47	5	3
Venereal	—	5	11	55	94	25
Guinea-worm	—	—	17	30	268	31
Wasting	—	—	—	—	630	—
Anæmia	51	81	16	83	33	188
Debility	1	—	22	—	802	—
Physically Unfit ..	—	—	—	—	265	—
Nervous	17	5	21	9	13	1
Eye affections	2	4	18	57	35	6
Ear affections	1	2	5	1	—	—
Cardiac	3	—	42	—	150	—
Respiratory	1	13	25	73	626	65
Digestive	23	17	37	—	67	—
Generative	—	—	27	—	129	—
Urinary	2	5	15	6	9	—
Hernia	1	—	29	13	145	2
Skin diseases	2	3	13	—	175	—
Organs of Locomotion ..	6	6	—	53	—	36
Local Injuries	5	—	21	61	51	19
Wounds in Action ..	15	25	121	64	—	8
Sunstroke	1	—	—	2	—	—
	176	343	685	990	7,713	2,164

TABLE III—*cont.*

Deaths.

Analysis of 459 *of the* 720 *Deaths from Disease among Europeans and Natives of the Allied Forces.*

Enteric Fever	.. ..	6	
Dysentery	.. ..	176	
Blackwater	.. ..	5	
Malaria	.. ..	13	
Pneumonia	.. ..	156	
Tuberculosis	.. ..	4	
Bronchitis	.. ..	17	
Pleurisy	.. ..	3	
Hæmoptysis	.. ..	1	
Major Septic	.. ..	8	
Heart	.. .. ..	5	
Carried forward	..	394	
Brought forward	..	394	
Beri-beri	.. .. ..	12	
Syphilis	.. .. ..	1	
Digestive	.. ..	31	
Local Injuries	.. ..	10	
Pyrexia, uncertain origin		1	
Hernia	.. .. ..	1	
Nervous	.. .. ..	5	
Rheumatism	.. ..	2	
Urinary	.. .. ..	1	
Connective Tissue	..	1	
Total	..	459	

TABLE IV.

Contents of Medical and Surgical Boxes of Field Units.

MEDICAL FIELD CASE.

200 Tabloids Phenacetin Co. gr. V.
200 Tabloids Phenacetin gr. V.
100 Tabloids Quin. Hydrochlor. gr.V.
1000 Tabloids Quinine Bisulph. gr.V.
100 Tabloids Calomel gr. III.
100 Tabloids Cascara Sagrada gr. V.
200 Tabloids Soda Salicyl. gr. V.
100 Tabloids Pulv. Ipecac. Co. gr. V.
100 Tabloids Plumbi cum Opii, gr.IV.
100 Tabloids Livingstone Rousers.
600 Tabloids Tinct. Camph. Co., Min. XV.
100 Tabloids Ammonii Carb. gr. V.
400 Tabloids Opii gr. I.
100 Tabloids Bismuth Subnit. gr. V.
100 Tabloids Potassi Brom. gr. V.
200 Tabloids Potassi Permang. gr. II.
100 Soloids Alum gr. X.
100 Tabloids Pot. Chlor. and Borax gr. V.
100 Tabloids Acid Boric gr. V.
100 Soloids Hydrarg. Perchlor. gr. 8·75.
100 Tabloids Sodii Bicarb. gr. V.
1 lb. Lin. Iodi, in 4 oz. bots. (4 oz.).
1 lb. Chlorodyne, in 4 bots. (4 oz.).
8 oz. Chloroform (in 4-oz. bottles).
1 Catheters à Boule (Nos. 3, 5 & 6).
½ doz. Camel Hair Brushes.
2 doz. Morphia Suppositories gr. ½.
1 Minim Measure Glass.
3 Clinical Thermometers.
2 Glass Syringes (2 oz.).
Dusting Powder.
2 lb. Ung. Hydr. Ammoniati.
2 lb. Ung. Boric.
1 lb. Ung. Linci.
1 lb. Ung. Chrysarobin.
1 lb. Capsici (B.P.).
6 lb. Mag. Sulph.
1 oz. Croton Oil.

THOMPSTONE'S DRUG BOX.

1 Pint Lin. Commune.
1 Pint Mist. Tussi.
1 Pint Mist. Diarrhœa Conc.
1 Pint Mist. Alternative Conc.
2 Pint Oleum Ricini.
1 Pint Liq. Santal Buchu and Cubeb.
1 Pint. Tinct. Benzoin Co.
½ Pint Tinct. Opii.
6 lb. Mag. Sulph.
2 lb. Ung. Chrysarobin.
200 Quinine Tabloids gr. V. (B.W. & Co.).
1 Medicine Tumbler.
1 Measure Glass.
1 Table Spoon.

SURGICAL FIELD CASE.

6 doz. Hospital Bandages.
4 lb. Hospital Lint.
4 lb. Maw's Gauze Tissue.
2 yds. Jaconet.
1 Higginson's Syringe.
6 yds. Iodoform Gauze.
1 pair Ward Scissors.
1 Kidney Shaped Bowl.
100 Soloids Chinosol.
4 oz. Iodoform in Dredger.
12 Lister's Cyanide Gauze Bandages
6 Bottles, each containing 8 oz. Chloroform.
6 Bottles, each containing 8 oz. Ether.
1 Army Regulation Amputation Case.
1 bottle Drainage Tubes.
1 bottle Needles.
1 set Tooth Instruments.
2 bottles Catgut Ligatures.
1 oz. Oleum Caryophyll.

MEDICAL COMFORT BOX.

½-tins Ideal Milk	40
Tins Brand's Essence	20
Tins Libby's Essence	20
Bottles Brandy	2
½-bottles Champagne	2

SURGICAL DRESSING BOX.

12 doz. Asstd. 2nd Quality Porous Hospital Bandages.
2 doz. Gauze Bandages.
6 lb. Hospital Lint.
2 lb. Gamgee Tissue.
2 lb. Wood wool Tissue.
2 yds. Jaconet.
2 lb. Marine Lint.
6 yds. Iodoform Gauze.
1 Higginson's Syringe.
1 pair strong Large Ward Scissors.
1 Round Enamel Iron Dressing Bowl.
100 Soloids Chinosol.
4 oz. Iodoform in tin dredger.
100 Soloids Pot. Permang.
100 Soloids Acid Boric.
1 oz. Acid Carbolic Pure.
1 Stick Argent. Nit.
3 doz. Triangular Bandages.
12 doz. Safety Pins.

TABLE V.

List of Drugs, etc., required for Three Months.

Spirit. Ammon. Aromat.	20 lb. in 1 lb. bottles.
Pulv. Ammon. Carb.	112 lb.
Tab. Ammon. Carb. gr. III	1 gross bottles.
Ammon. Chlor. Pulv.	20 lb.
Ammon. Chlor. Tabs., gr. III	1½ gross bottles.
Tab. Ferri et Arsen. Co. (B. & W.)	200 bots. of 10 tabs.
Pure Chloroform	90 ½-lb. bottles.
Pure Ether	100 7-oz. phials.
Lin. Bellad	30 lb.
Lin. A.B.C.	40 lb.
Lin. Communis	200 lb.
Bismuth Carb.	12 lb.
Bismuth Salicyl.	8 lb.
Pulv. Acid. Boric.	300 lb.
Carb. Liq. Pur.	10 galls. in 2-lb. bots.
Cyllin, Crude	45 drums of 5 galls. each.
Craeta Preparata	28 lb.
Copaiba mist.	112 lb. in 1-lb. bots.
Digitalin Hypo. inj. gr. 1/100	3 boxes.
Digitalin and Strych. Sulph. hypo. inj. gr. 1/100 of each	3 boxes.
Quinine Ampoules	2,000
Quinine Hydrochlor.	300 bottles of 100.
Sod. Chloride Soloids gr. XL	60 tubes.
Sandal Wood Oil (Caps.)	144 bottles.
Sandal Wood Oil (Tabs.) mins. V	144 bottles (B.W.)
Sod. Bicarb.	40 lb.
Sod. Salicyl.	20 lb.
Sod. Sulph.	90 lb.
Scillæ Tinct.	70 lb.
Scill. et Ipecac. Tabs. gr. IV	1 gross bottles.
Senega Tinct. Co.	70 lb.
Urotropin	2 lb.
Urotropin in tabs. gr. III	4 doz. bottles.
Tab. Digitalin Hypo. gr. 1/100	1 gross tubes.
Tab. Strych. Hypo. inj. gr. 1/100	1 gross tubes.
Tab. Morph. Hyd. Hypo. inj. gr. ½	1 gross tubes.
Quinine Bihydrochlor. gr. V	2 gross botts. of 100.
Tabs. Pilocarpine	72 tubes.
Absolute Alcohol	5 galls.
Methyl. Alcohol	10 galls.
Spt. Vini Rect.	10 galls.
Emplastrum Belladon.	3 boxes.
Medical Boxes	20
Thompstone's Drug Boxes	40
Medical Field Cases	100 (Specially designed for the Cameroons, and obtained in 1915).
Cotton-wool (Bleached) absorb.	1,000 packets.
Gauze, white, 6 yds.	1,000 packets.
Gauze, Iodoform, 6 yds.	1,000 packets.
Grey Baft, 56 in.	100 yds.
Surgical bandages, assorted	20,000
Clinical Thermometers	144
Hypodermic Syringes (B. & W.) all glass	30 with needles.
Needles	144
First Field Dressings	3,000
Surgical Dressing Boxes	100

TABLE VI.

Field Rations issued to Native Troops and Carriers on Second Jaundé Expedition.

	Protein. Gr.	Carbo-hydrates Gr.	Fat. Gr.	Calorie Value.
Jaundé Rations.				
Biscuit, ¾ lb. ..	36	225	6·5	1,138 Cal. } 2,169 Calories+
Rice, ⅜ lb. ..	13	129	·8	588 Cal. } 200 or so for
Meat, ¼ lb. ..	22	—	37	443 Cal. } sugar when given.
	71	354	44·3	
No. 1 *Rations.*				
Biscuit, ½ lb. ..	12	75	2·15	379·4 Cal. } 1,898·8 Calories.
Rice, ¼ lb. ..	26	258	1·6	1,076·4 Cal. }
Meat, ¼ lb. ..	22	—	37	443 Cal. }
	60	333	40·75	
No. 2 *Rations.*				
Biscuit, ½ lb. ..	12	75	2·15	379·4 Cal. } 1,661·4 Calories.
Meat, ½ lb. ..	44	—	74	886 Cal. }
Chocolate, ⅛ lb.	7·3	27	28	396 Cal. }
	63·3	102	104·15	
Average Army Ration (Peace)	140	500	90	About 3,500 Calories in peace, and 4,000 in war.

It will be seen by the above that the Jaundé Ration was cut down to the lowest safe amount and that the other two rations have only half the value of the European Army Ration.

Larger rations could not have been carried, owing to transport difficulties, but the native soldier or carrier could generally supplement his ration from the bananas, cassava, or yams found on the line of march.

TABLE VII.

Orders issued for Precautions in case of Yellow Fever occurring at Duala.

1. Challenger Pool will be used as a quarantine anchorage.
2. All launches and boats to be cleaned and fumigated when necessary, (bilges pumped out, and oil or antiseptic fluid put in). Canoes and boats on shore to be overturned. All launches and boats satisfying these requirements, and the Examining Officer, work unrestricted.
3. As many lighters as possible to be anchored at night at a distance of 200 yards from shore.
4. No ship to leave Duala for Ports outside Cameroons before being visited by a Medical Officer of Health, and the Captain obtaining a Bill of Health from the Chief Officer of Customs that all on board are "Healthy," that the condition of the vessel is satisfactory, and they have conformed to the regulations in force. Whoever acts in contravention of these rules shall be punishable with a fine, not exceeding Fifty Pounds, or with imprisonment, not exceeding three months, with or without hard labour.
5. Launches, other than Naval and Dockyard launches, should not come alongside any wharf without a permit.
6. With the exception of those officials, the King's Harbour Master, Medical Officer of Health, and Customs Officials, having legitimate Government business with an incoming merchant vessel, no one else to board her till she is cleared.
7. Canoe traffic to and from Duala should not be permitted at night.
8. Vessels and crews working between Duala and ships at the base will be inspected before proceeding, and the Master of the base tender given a clean Bill of Health by the Medical Officer of Health.
9. Persons from the shore should not be allowed to board vessels lying at anchor in the port without a permit to do so, and the Master of the vessel should be held responsible that each person visiting his ship has his permit when on board.
10. Ships, small craft and canoes, etc., are to keep as far away as possible from a ship which is flying the Quarantine flag. With the exception of the Boarding and the Medical Officers' Boats, no ship, small craft or canoe is to remain within 200 yards of a ship flying the Quarantine flag.
11. The Senior Naval Medical Officer to be the representative Sanitary authority for all vessels and craft under the Senior Naval Officer. The Director of Medical Services and the Senior Sanitary Officer to be the responsible Sanitary authorities for all merchant vessels and craft.

Rules on Shore.

1. The house in which one or more cases of yellow fever has occurred should be immediately evacuated by the occupants, and the house fumigated. Should the case occur in a native dwelling, an area of 400 yards in all directions should be considered in quarantine, and all the houses within that area evacuated and fumigated.
2. All the occupants of the dwelling in which the case has occurred should be isolated at some place to be decided upon, and kept under immediate medical supervision.
3. All natives living in the quarantine area to return to their houses after the fumigation is completed, and to remain under observation for such a period as is considered necessary.
4. Steps should be taken to inform the native population of the danger of allowing stagnant water to lie about under houses and compounds.
5. The native town should be thoroughly cleaned by the natives of the town, all empty bottles, tins, etc., collected and destroyed. Long grass and undergrowth should be cut down and removed, and all gutters cleaned.
6. Measures should be taken to prevent, as much as possible, natives from entering or leaving the quarantine area.

TABLE VII—*cont.*

7. Stagnant water which is difficult to remove to be sprayed with kerosene.
8. As many Europeans as possible should leave the town during the outbreak, and they should not return until such a period has elapsed as is considered safe for them to return.
9. Only the minimum number of natives should be allowed to remain in the European area at night.
10. All Europeans should use a mosquito net over their beds, and put on mosquito boots at nightfall.
11. An extraordinary effort should be made throughout the whole town and by all the inhabitants to ensure the destruction of mosquito larvæ.
12. The towns to be divided into five areas for Anti-mosquito work.
    (1) Bell Town.
    (2) Bonaberi—Military Portion.
    (3) Bonaberi—Civil Portion.
    (4) Aqua Town—French Portion.
    (5) Aqua Town—Civil Portion.

    The Director of Medical Services and the Senior Sanitary Officer will be the responsible authorities for Areas (1) and (2).

    The Chief Political Officer and the Senior Sanitary Officer for Areas (3) and (5).

    The Senior French Medical Officer for Area (4).

    The military sanitary gang of 80 for Bell Town, and 20 for Bonaberi, to continue to deal with Areas (1) and (2).

    The Chief Political Officer to have an anti-mosquito campaign in Areas (3) and (5), through the local Chiefs.

    The Senior French Medical Officer to employ sanitary labourers for Area (4).
13. Routine order No. 176 (paragraph 2) to be republished in orders.
14. Traffic up railways to be restricted to military moves, after medical inspection by Medical Officer in charge.

APPENDIX G

TABLES CONNECTED WITH THE CAMPAIGN IN SOUTH-WEST AFRICA

Table I.—Admissions, Deaths, and average duration of treatment for groups of disease or injury.

Table II.—Admissions, Deaths, and average duration of treatment of the more important diseases.

Table III.—Average weekly sick-rate.

Table IV.—Deaths from Disease in and out of hospital.

Table V.—Admissions and Deaths according to arms of the service.

Table VI.—Numbers treated in each of the principal hospitals.

Table VII.—Deaths amongst natives.

Table VIII.—Field Poison Testing Equipment.

TABLE I.

Summary of the Number of Admissions to Hospital, the Number of Deaths, and the Average Duration of Treatment for each Group of Disease or Injury (5*th August*, 1914, *to* 14*th August*, 1915).

Disease or Injury.	Totals all Hospitals and Stations.			
	Total Number of Admissions to Hospitals.	Total Number of Days Treated.	Deaths in Hospitals.	Average Duration of Treatment in Hospitals—Days.
General Diseases	6,350	112,099	42	17·65
Diseases of the Nervous System and of the Organs of Special Sense	1,698	32,663	3	19·24
Diseases of the Circulatory System	1,672	32,983	2	19·73
Diseases of the Respiratory System	1,518	25,217	13	16·61
Diseases of the Digestive System	6,457	87,539	20	13·56
Non-venereal diseases of the Genito-urinary System and Annexa	733	13,893	2	18·95
Diseases of the Skin and of the Cellular Tissue	1,279	20,423	—	15·97
Diseases of the Bones and of the Organs of Locomotion	929	16,699	—	17·98
Malformations	13	318	—	24·46
Affections produced by External causes	1,989	34,914	17	17·55
Ill-defined Diseases	2,195	23,700	1	10·80
Gunshot Wounds received in action	534	21,985	29	41·17
	25,367	422,433	129	16·65

TABLE II.

Admissions to Hospitals, Number of Deaths, and the Average Duration of Treatment for some of the more important Diseases grouped in Table I.

Disease or Injury.	Total for all Hospitals. Whole Period of Hostilities.			
	Number of Admissions to Hospitals.	Number of Days Treated.	Number of Deaths.	Average Duration of Treatment.
General Diseases.				
Typhoid Fever	215	10,009	20	46·55
Malta Fever	14	625	—	44·64
Malaria	518	6,690	1	12·91
Influenza	1,052	8,542	—	8·12
Dysentery	715	11,097	11	15·52
Syphilis	227	8,427	—	37·12
Gonococcus Infection	1,130	24,493	—	21·67
Scurvy	10	108	—	10·80
Diseases of the Respiratory System.				
Bronchitis	627	8,665	1	13·82
Pneumonia, Broncho and Lobar	124	3,262	10	26·30
Diseases of the Digestive System.				
Diarrhœa and Enteritis	2,927	28,417	2	9·71
Intestinal parasites—Bilharzia	153	2,324	—	15·19
Appendicitis	374	10,402	6	27·81
Affections produced by external causes.				
Effects of heat	406	4,324	1	10·65
Gunshot Wounds received in action.				
Head	27	667	7	24·70
Face	25	1,347	—	53·88
Chest	39	1,515	1	38·85
Neck	16	456	—	28·50
Abdomen	29	763	9	26·31
Back and Spine	21	496	2	23·62
Genital and Urinary Organs	2	210	1	105·00
Upper Extremities	132	5,237	—	39·67
Lower Extremities	228	10,577	3	46·39
Multiple Wounds	15	717	6	47·80

TABLE III.

Statement showing the Average Weekly Sick-rates during the period 27th December, 1914, to 14th August, 1915.

Week ended.	Approximate Strength of Forces in the Field.	Patients in Hospital.	Average Weekly Sick-rate, per cent.
1915.			
2nd January	41,529	1,277	3·07
9th ,, ...	41,529	1,217	2·93
16th ,, ...	44,668	1,227	2·75
23rd ,, ...	44,668	1,244	2·59
30th ,, ...	48,030	1,294	2·69
6th February	49,120	1,467	2·98
13th ,, ...	49,120	1,502	3·05
20th ,, ...	49,120	1,609	3·24
27th ,, ...	49,572	1,625	3·29
6th March	49,317	1,635	3·31
13th ,, ...	49,911	1,462	2·93
20th ,, ...	49,911	1,745	3·54
27th ,, ...	49,272	1,566	3·17
3rd April	46,912	1,696	3·61
10th ,, ...	46,912	1,430	3·05
17th ,, ...	45,320	1,320	2·91
24th ,, ...	45,320	1,482	3·25
1st May	45,320	1,571	3·46
8th ,, ...	45,320	1,454	3·21
15th ,, ...	45,320	1,550	3·40
22nd ,, ...	45,320	1,242	2·74
29th ,, ...	40,393	1,245	3·08
5th June	40,393	1,349	3·34
12th ,, ...	38,266	1,018	2·66
19th ,, ...	34,914	1,360	3·89
26th ,, ...	34,367	1,124	3·24
3rd July	34,367	1,450	4·18
10th ,, ...	34,367	1,202	3·47
17th ,, ...	30,407	1,014	3·33
24th ,, ...	26,590	817	3·07
31st ,, ...	24,553	632	2·57
7th August	20,008	635	3·17
14th ,, ...	19,252	578	3·02

TABLE IV.

Table of the Deaths from Disease both in and out of Hospital.

Cause of Death.	Total.
Typhoid Fever	26
Malaria	2
Measles	3
Dysentery	13
Chicken-pox	1
Tuberculosis	3
Septic Wounds and Injuries	3
Cancer	3
Rheumatism	1
Diabetes	1
Meningitis	2
Cerebral Hæmorrhage	1
Paralysis	1
Mental Complaint	1
Heart Disease	5
Diseases of the Veins	2
Bronchitis	1
Pneumonia	12
Pleurisy	1
Miner's Phthisis	2
Emphysema	1
Disease of the Pharynx	1
Disease of the Œsophagus	1
Ulcer of the Stomach	4
Other diseases of the Stomach	1
Diarrhœa and Enteritis	2
Appendicitis	6
Hernia	4
Diseases of the Liver	5
Nephritis	2
Stricture	1
Hyperpyrexia	1
Indefinite	2
Total	115

TABLE V.

Summary of the Number of Admissions to, and the Number of Deaths in Hospitals, classified according to the Arm of the Service.

Arm of Service.	Total for whole Period of Hostilities.	
	Admissions to Hospital.	Deaths in Hospital.
Royal Naval Volunteer Reserve	30	—
Permanent and Headquarter Staffs	133	—
Permanent Force (S.A.M.R. and S.A. Police)	2,769	20
Artillery	1,331	4
Mounted Rifles	3,907	16
Dismounted Rifles	914	7
Commandoes	4,624	31
Infantry	8,239	27
Engineers	982	6
S.A. Medical Corps	744	3
Intelligence Units	109	—
Service Corps (including Veterinary)	1,033	8
Motor Contingents	257	—
Miscellaneous and Clerical	258	6
Aviation	57	1
Totals	25,367	129

TABLE VI.

Table showing the total Number of Officers N.C.O.'s and Men treated at the Principal Hospital Bases during the Period of Hostilities.

Stations..	Officers.			N.C.O.'s and Men.			Total all Ranks.		
	Total admissions to Hospital.	Total Number of days treated.	Deaths in Hospital.	Total admissions to Hospital.	Total Number of days treated.	Deaths in Hospital.	Total admissions to Hospital.	Total Number of days treated.	Deaths in Hospital.
Wynberg and Cape Peninsula	165	5,254	1	6,006	178,077	20	6,171	183,331	21
Swakopmund	234	1,898	1	5,554	50,224	26	5,788	52,122	27
Lüderitzbucht	180	1,724	—	3,980	49,824	10	4,160	51,548	10
Keetmanshoop	10	132	—	209	2,632	1	219	2,764	1
Port Nolloth and Steenkopf	10	198	—	344	5,111	3	354	5,309	3
All other hospitals (including field, clearing and civil hospitals)	282	4,406	2	8,393	122,953	65	8,675	127,359	67
	881	13,612	4	24,486	408,821	125	25,367	422,433	129

TABLE VII.

*Causes of death amongst Natives employed by the Union Department of Defence during the course of Hostilities.**

Enteric fever	2
Dysentery	5
Pulmonary tuberculosis	3
General tuberculosis	7
Syphilis	1
Scurvy	5
Meningitis	1
Organic disease of the heart	4
Bronchitis	4
Pneumonia	15
Gastro-enteritis	3
Intestinal hæmorrhage	1
Cirrhosis of the liver	1
Bright's disease	2
Calculi of urinary passages	1
Suicide by firearms	1
Sunstroke	2
Homicide by stabbing	1
Homicide—hanged by Germans	1
Accident	11
Ill-defined disease	1
Not stated	20
Total	92
Killed in action	9
Died of wounds	3
Total number of deaths from all causes	104

* This list has been compiled from information received from the Acting Director of Native Labour supplemented by reports received from various other sources, but it is doubtful if it is either very exhaustive or accurate.

TABLE VIII.

Field Poison Testing Equipment. Directions for Use.

The Equipment consists of the following :—

I.—Test for Arsenic, Mercury, etc.

3 test-tubes,
copper foil,
1 Scout stove.

II.—Test for Strychnine.

1 evaporating dish,
1 tripod stand,
1 asbestos wire gauze,
2 oz. sulphuric acid,
2 oz. potassium bichromate,
1 separating funnel.

III.—Cyanide Test.

2 oz. ferrous sulphate cryst.,
4 oz. ferric chloride solution,
8 oz. caustic soda solution,
2 dropping tubes,
3 test-tubes,
4 oz. hydrochloric acid, strong.

I.—Arsenic, Mercury, etc.

A test-tube seven inches long and quite half-inch diameter is one-third filled with the suspected water. Into this is poured strong hydrochloric acid, about one-fourth as much as the water already in the tube. A small strip of *clean* and *bright* copper foil, about one-eighth of an inch wide and half an inch long is placed in the tube, and the water is boiled for *at least* ten minutes. If the copper remains bright and unchanged in colour it may safely be assumed that neither arsenic nor mercury is present in the water in dangerous proportion—dangerous, that is to say, only when applied to a *temporary* water supply. If arsenic, mercury, antimony, or bismuth were present in the water the strip of copper would change from a copper to a greyish or steel colour. A *practised* eye may be able to distinguish the deposits of arsenic, antimony, mercury, or bismuth on the copper from one another, but it is advisable that a water which gives *any* such grey deposit on the copper should be avoided as dangerous.

By the above test one five-thousandth of a grain of arsenic in an ounce of water (about three-hundredths of a grain in a gallon or one 250th of a grain in a pint) may ordinarily be detected. This could not be regarded as a dangerous amount.

Arsenic may be added to water for poisoning purposes in the form of sodium arsenite (which is white) or as one of the numerous yellow arsenical sheep dips.

Mercury may possibly be added as corrosive sublimate (mercuric chloride) which is in constant use in surgery as an antiseptic.

II.—Strychnine.

Strychnine is one of the vegetable poisons known as " alkaloids." For an untrained person to apply certain tests for alkaloids and the analogous class of poisons called glucosides is practically impossible. Many of these, unknown to science, occur in various parts of South Africa. Most of them have a bitter taste, and although the poisonous nature of glucosides (but not of the alkaloids) may be destroyed by *prolonged* boiling, it is highly necessary to reject all water possessing a bitter taste as possibly a *deadly* poison.

TABLE VIII—*cont.*

Strychnine being largely used in South Africa for jackal poisoning, may be available in large quantities, and so it would be desirable to test for it in all waters regarding whose safe use there is any suspicion.

To test for strychnine place in a white porcelain evaporating dish about two ounces of the water to be tested and evaporate it over a flame until a dry residue is left. The utmost care is necessary to prevent this residue from being destroyed by overheating; when the water is nearly evaporated off the basin should be removed from direct contact with the flame, and held some little distance above it, waving the basin gently backwards and forwards over the flame until the residue is quite dry. Allow it to become quite cool, then by means of a glass rod, add three drops—but not more than three drops—of strong sulphuric acid to the residue and stir it into the residue so as to form a small quantity of thick liquid or a kind of paste. If the residue is bulky it may completely absorb the three drops of sulphuric acid. When this happens add two drops more or the smallest quantity of acid that will produce a paste or thick liquid, and then stir so as to get an uniform mixture. Now add the tiniest fragment of potassium bichromate powder (not more than the size of a pin's head) pushing it into the paste or solution by means of the glass rod. Under ordinary circumstances a greenish colour will be produced, but when strychnine is present a purple-violet colour will appear wherever the bichromate and the liquid have come in contact with each other.

Should the water to be treated contain an appreciable quantity of organic matter this test will fail, because the sulphuric acid would in such a case char the organic matter and so render the water dark, preventing the purple-violet colour from being seen. In such a case pure strychnine would have to be extracted from the water before the test can be applied. This should be done only by one trained in chemical manipulation. About two ounces of the water are made distinctly (but not too strongly) alkaline with caustic soda solution and placed in a tapped separating funnel. About half an ounce of chloroform is added, and the mixture is thoroughly shaken for some minutes. It is then allowed to stand in the separating funnel until the layer of chloroform has separated out from the mixture. The chloroform is drawn off through the tap into a white porcelain evaporating dish, and the chloroform evaporated off from the residue to which the test above described is then applied (i.e., the residue is moistened with strong sulphuric acid and treated with a fragment of potassium bichromate).

III.—Cyanides.

The suspected water is placed in a test-tube. To it is added a few drops of caustic soda, followed by three or four drops first of ferrous sulphate solution. This will produce a dirty brown precipitate of mixed ferrous and ferric hydroxides whether cyanides are present or not. The mixture is gently heated and allowed to stand for five minutes. Some hydrochloric acid is then added which will dissolve the brown precipitate, and if cyanide is present the liquid will acquire a blue colour. If only a minute quantity of cyanide is present the liquid will appear green; in the presence of a larger quantity of cyanide the liquid is light blue; still more renders it darker blue, and if the water is very strongly charged with cyanide it will not merely acquire a blue colour but even produce a dark blue *precipitate*.

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